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**PRESSURE OF POPULATION
AND
ECONOMIC EFFICIENCY IN INDIA**

BY

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**NEW DELHI
INDIAN COUNCIL OF WORLD AFFAIRS**

**BOMBAY CALCUTTA MADRAS LONDON
OXFORD UNIVERSITY PRESS**

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First published November 1946

H O

P R E F A C E

This book was written about the end of last year. Since then great events have happened in this country. We have entered the penultimate stage of our political development, and acquired wide powers of shaping our future.

In the construction of this future the size and growth of our population will play a large part. The issues raised by them are complex and pervasive and affect, directly or indirectly, almost all aspects of our common existence.

I have, in the following pages, tried to unravel them and bring them within reach of understanding of the intelligent layman. I have, moreover, endeavoured to be as objective as possible, to state the facts, analyse them and draw the conclusions which the analysis suggests.

As far as possible, emotions have been kept at bay; there is no economic question in which they intrude so easily and obscure reasoning as that of population. The argument of the book has, in consequence, acquired a certain rigour and terseness. But I feel that if my central thesis has thereby gained in point and clarity, I shall have attained my main objective. Let the people of this country be population-conscious, realize its supreme importance and understand the infinite ways in which it influences their life. They will then someday agree on its solution. To-day reasoning is opposed by emotion, and conclusions carefully arrived at are opposed by unexamined prejudices. The first step in the solution of our population question is to get out of this stage of obscurantism, and if this small book makes any contribution to this result, my labours would be amply rewarded.

D. GHOSH

Indian Central Jute Committee
Calcutta, 26 September 1946

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PART I

THE DYNAMICS OF INDIAN POPULATION

I

The Census of 1941 recorded a population of 389 millions in India, a number somewhat larger than that of Europe minus European Russia. During the fifty years that had preceded the census, the population of the country had increased by 110 millions or 39%. The aggregate population of France and Germany in 1940 only was slightly greater than this.

These are large figures. Yet we cannot directly conclude from them either that our present numbers are too large or that our rate of growth has been too rapid. In the first place, we are dealing with a fifth of the world's population, occupying a sub-continent of 1·6 million square miles. Secondly, between 1891 and 1941 we expanded less rapidly than the peoples of many other countries.¹ And finally, it remains open to the optimist to say that given certain conditions, economic and political, this country can support a larger number than it contains at present and that if we had exploited our resources as ably as others, we could have afforded a greater rate of growth than we have experienced.

We shall not, however, engage in this interminable controversy. That our numbers are large and our rate of growth has been rapid in recent decades no one can gainsay, and we can fruitfully examine the serious issues which they raise. The following table gives the absolute numbers at successive censuses since 1891 and the percentage growth from decade to decade :

1. Between 1870 and 1930 the population of India increased by 31%, that of Europe minus Russia by 60% and of Japan by 113%. The gross increase in Europe must have been larger than 60%, as she sent out huge numbers to other parts of the world as emigrants.

Population of India

Year	Persons (Millions)	Intercensal growth (Millions)	Change %
1891	279·4		
1901	283·9	+ 4·5	+ 1·6
1911	303·0	+ 19·1	+ 6·7
1921	305·7	+ 2·7	+ 0·9
1931	338·1	+ 32·4	+10·6
1941	389·0	+ 50·9	+15·1
1891-1941		+109·6	+39·1

II

The population of a country can be regarded from two points of view. We can look upon it as a collection of human beings which grows and expands (or contracts) at a certain rate. We can also consider it as a body of persons engaged in producing various goods and services on which its material welfare depends. Obviously, there should be some sort of balance between these two branches of its activity. If it reproduces itself faster than its wealth and income increase, poverty, misery and suffering ensue. On the other hand, it may pursue wealth and material progress with a measure of attention that interferes with its urge to reproduce and endangers its future existence.

We, in this country, are not concerned with problems of the second variety which face the nations of Europe, the U.S.A. and the British Dominions to-day. There are no signs of our productive activity interfering with the scale of our reproduction ; on the contrary, as we shall soon see, our productive efficiency is being seriously affected in every direction by the size and the rate of growth of our number.

The reproductive performance of a population is commonly indicated by its birth-rate, i.e., by the number of births per thousand of its aggregate number. In 1939, our birth rate was 34 per thousand of the population ; in 1931² it had been 35. These are officially recorded rates, which are, however, known to be under-estimates. Laws that make registration of vital events compulsory have been in force among us for quite some time and now extend to nearly the whole country. But, in practice, they are loosely enforced ; neither the administration nor the public seem to be sufficiently conscious of their importance and a good proportion of the births and deaths that happen in the country escape the official records.

We can, however, estimate our birth rate indirectly. We can calculate our gross death rate from the life-table of our 1931 population³ and add to it the inter-censal rate of growth of 10·6%. By this process we get a birth rate of 45 per thousand, instead of the officially recorded

2. Though we had a population census in 1941, we have to use the 1931 census data for most purposes. The former was an extremely truncated affair ; for reasons of misplaced economy the Government of India had decided to limit the census tabulation to a few items of interest only.

3. A life table population shows the number of persons of each sex who may be expected to be living in each age class at given death rates (assuming a given ratio at birth of male to female infants) on the hypothesis of an equal number of births occurring indefinitely in successive years. Supposing we start with a total of 100,000 male births and then apply to this number the current rate of death among male infants in the first year of life, we get the number that survives to age 1 ; we then reduce this number by the death rate among male infants in the second year of life to get the survivors to age 2. We continue the process until the oldest survivor disappears. Obviously, if we assume a continuous succession of, say, 100,000 births year in and year out, we shall in time get a population in which the total number of deaths is just equal to the total number of births i.e., 100,000. Thus the life table population is stationary. For Indian Life Table Populations in 1931, see Report of the Actuary to the Census Commissioner, 1931.

POPULATION AND EFFICIENCY IN INDIA

rate of 34. The life-table population of females, however, contains a higher proportion of persons in ages 15 to 45 than our actual population,⁴ so that our actual birth rate has to be reduced somewhat. It would appear reasonable to put it at 40 per thousand of the population. We cannot be perfectly certain about this calculated rate ; after all it is an estimate, arrived at indirectly from certain other data which are themselves imperfect. But it seems to be nearer the true rate than the official figure, and very similar birth rates obtain in countries like China and Egypt in which the masses are, more or less, in the same stage of economic and cultural development as ours.⁵

Our calculated rate is very much higher than the rates which prevail among Western populations. To take the birth rate in England and Wales : it was only 15·8 in 1931, and we have to go back to the 1870's to find rates as high as our present official rate. Whatever might have been the tempo of our growth in the past, as compared with that of European populations, we are to-day on quite a different level of reproductive activity from what obtains in the West. This is significant from the point of view of our future.

The birth rate is, however, an imperfect index of the reproductive performance of a people. It relates the number of births in a year to the total population, while obviously only a section of that population is responsible

4. Women in ages 15 to 45 were 50% of all women in the life table population and 46% in the actual population of 1931.

5. 'There is no registration of births and deaths in China,' says Pelzer, 'so that information regarding vital statistics and population growth can be estimates only. F. A. Notestein and Ching Ming Chao report a crude birth rate of 38·3 per 1000 population for the whole area under investigation, the rate being 37·4 for North China and 39·0 for South China. But the authors themselves state that this is probably a conservative statement of the actual rate which may well have been over 40.'—Karl J. Pelzer, *Economic Survey of the Pacific Area*, Part I, Population and Land Utilization, p. 34. In Egypt the birth rate was 42·9 in 1931-35.

for the inflow of new lives. To appreciate the strength of the reproductive activity of a people, therefore, we should consider the total number of births that take place within it in relation to the size of its reproductive section. Only women in child-bearing ages contribute to the growth of population, and a reproduction rate much more satisfactory than the ordinary birth rate is given by the ratio between total births and the number of child-bearing women in a community. In 1931 this rate, known as the general fertility rate, was 177 in India. A still more refined rate relates births to married women only in the reproductive ages. In 1931 our Married (Gross) Fertility Rate was 222. The comparable figure for England and Wales—which may be taken as representative of West European and North American countries—was 123 in the same year.

The proportion of married women in the reproductive period, which is the denominator of the fraction that expresses the married (gross) fertility rate, is, however, made up of three other ratios, viz., the proportion of all women to total population, the proportion of women in the child-bearing period to all women, and finally the proportion of married among women in the reproductive ages. The significance of these ratios may be briefly considered. In the first place, we consider women only. This does not mean that the rôle of man in the birth of a new generation is unimportant ; it implies simply that under monogamy, which is the prevalent form of marital relationship, the number of children to whom a man becomes father is equal to that to whom his wife is mother, and we need count only one of the two partners in the joint enterprise of child-bearing. There is, moreover, a definite advantage in choosing the female partner ; for certain physiological changes make the upper limit of the reproductive period much more precise for women than for men. Secondly, we take into account only women in the child-bearing ages. Whether a population has few or many women in ages prior to the commencement of child-bearing or in the

years that succeed it, makes no difference to its current reproductive activity. For the purpose of our study we have assumed the reproductive period of Indian women to range from age 15 to age 45. These are not quite correct limits ; but they are broadly correct and extremely convenient for reasons that we shall state shortly. Finally, we consider married women alone. Probably all except a very small number of births in our country take place within wedlock. In any event, we have no data on illegitimate births in our population.

In 1941 there were 940 women for every 1000 men in our population. In England and Wales the ratio was 1088 women to 1000 men. We had a deficit of females ; the English population, of males. Various explanations have been given of this phenomenon of sex deficiency of our population. Some persons attribute it to relative under-enumeration of women at the census. This is a possible, but insufficient, explanation. Our sex deficiency has been on the increase during the last forty years over which the efficiency of our census organization has improved rather than declined. According to others, masculinity is an index of race decadence, and Indians are, in their opinion, a decadent race. Unfortunately, little is known for certain about racial decadence and its symptoms and causes, and there are races, e.g., the Japanese, which have a deficit of females, but which can hardly be described as decadent by any standard of practical achievement that we may adopt. Again, within India itself the sex ratio is more unfavourable in the north and north-west, inhabited by the so-called martial races, than in the south or south-east. We cannot argue from masculinity to racial decay, unless we assume the former to be the symptom of the latter. Again, some people ascribe our sex deficiency to female infanticide and comparative neglect of the female child. Female infanticide does exist in parts of this vast country ; but it is of insignificant proportions, hardly important to influence the general sex ratio. And like under-enumeration, it does not explain the

increasing margin between the numbers of the two sexes from census to census. Finally, it is difficult to reconcile this explanation with the fact that we have actually an excess of girls over boys in all ages from 1 to 4. And since more boys than girls are usually born in every society,—the ratio is normally from 105 to 108 boys per 100 girls born—we cannot have an excess of females in the first years of life, if female infants are being choked off in large numbers all over the country ! Nor can we attach great value to comparative neglect of the female child as an explanation of the phenomenon we are discussing. The Census of 1931, it is true, discloses a shortage of females as compared with males in the age period 5 to 10. But this cannot be due to the neglect of the female child, for the table of specific mortality rates, i.e., death rates by single age years, prepared by the Actuary to the Census Commissioner of 1931, shows that deaths are less frequent among girls than boys in all ages up to 11.

There is, finally, a biological explanation, which is best stated in the words of their authors. According to Sedgwick, the Census Superintendent of Bombay in 1921, 'the Indian caste system with its exogamous *gotra* and endogamous caste, is a perfect method of preserving what is called in Genetics 'pure line'. The endogamy prevents external hybridization, while the exogamy prevents the possibility of a fresh pure line arising within the old one by the isolation of any character not common to the whole line'.⁶ Hutton, who was Census Commissioner for India in 1931, accepts this view in a modified form. He says : 'whether this proposition (of Sedgwick) be entirely acceptable or not, it may be conceded that if once a caste, whether as a result of inbreeding or some totally different factor, has acquired the natural condition of having an excess of females, this condition is likely to be perpetuated as long as inbreed-

6. *Census of India 1931, Vol. I, Part I, p. 197.*

ing is maintained'.⁷ Both the explanations seem plausible, but they do not seem to have been strengthened by securing answers to some basic questions. Do castes, which have maintained purity of line more than others, actually have a higher proportion of boys to girls born than is normal in human populations? To this query there is as yet no answer, because we do not have reliable data on sex ratio at birth in our population. And it is not possible to skip over this initial hurdle and try to explain sex deficiency by reference to the ratio of females to males at ages above zero. For the genetic factor, if there is one, inherent in the caste system should show its influence on the ratio at birth rather than at later ages.

There is, however, a simple explanation of the phenomenon available in the relative mortality conditions of our males and females. The female death rate is lower than the male death rate in this country in all ages from 0 to 11, but for ages beyond 11, the former exceeds the latter and the margin of excess increases with the advance of years. The situation is quite contrary with European populations. In England and Wales, e.g., the female death rate is lower than the male death rate, and the advantage in favour of women increases greatly at higher ages. These divergences fully explain our sex deficiency. They are, moreover, rooted in differences between the conditions of women in the two countries rather than in special sociological factors. In Western communities the deficiency of males is due to the dangers to which men are specially subject in the middle ages, while in the less advanced older countries the defect of females is in all probability the result of the more arduous labour that falls to their lot. Poverty, ignorance and lack of normal aids to healthy living, all of which

7. *Ibid.*, p 197.

tell more heavily upon female than male lives, sufficiently explain the deficiency of women in our population.

Since reproduction is a joint enterprise of men and women, a deficiency of females may plausibly affect its volume. But evidently it is not the deficit of women in all ages taken together that matters, but the defect, if any, in the reproductive period. We should, therefore, compare women in the reproductive ages to men in the same period. We have assumed the reproductive period of our women to be from 15 to 45. There is, however, a good case for putting the lower limit of the period at age 13 ; the 1931 Census enquiry into fertility showed a large number of women bearing children in ages 13-14. On the other hand, the majority of our women probably cease to reproduce some years before they reach age 45, and the upper limit of the child-bearing period may be put justifiably at below age 45. It is not, however, possible to make these desirable corrections ; for the only age statistics we have are in five-year periods. Our single year age data are wildly erratic and can be used only after they have been reduced to five year figures by a series of actuarial tricks that are supposed to bring them into semblance with reality. In 1931 there were in this country 75·4 million women in ages 15 to 45 compared with 79·9 million men ; females fell short of males by 4·5 millions. In England and Wales, on the other hand, women were in excess of males by 1·7 millions. Thus our sex ratio in the reproductive ages was somewhat unfavourable, and this fact should tend to lower our general fertility rate. But the loss is not as great as might appear at first sight. In England and Wales, the relative shortage of men has compelled many women to embrace spinsterhood and forgo their contribution to the expansion of the community. In this country the converse situation should have induced many men to remain bachelors. But our men have circumvented the difficulty by marrying

below their ages and recruiting wives from a wider age group of women.⁸

The next factor which affects birth rate is the proportion of women in the child-bearing ages. In 1931, women in ages 15 to 45 were 46·47% of all women in this country ; in England and Wales the corresponding percentage was 47·2. The English had a slightly higher proportion than we, and if other things were the same between the two populations, the English birth rate should have been higher than ours. But other things are significantly different. In England and Wales the high proportion of women in the reproductive ages is the outcome of a falling birth rate associated with a low death rate ; in our country it is the resultant of a high birth rate and a high death rate. The English birth rate has been falling for decades. The death rate too has fallen, but very much less in the higher than lower ages, so that the net outcome has been to increase temporarily the proportion of persons in the middle ages. In our country the birth rate has been, more or less, steady at a high level, and while the general death rate has fallen, the structure of specific mortality rates has not changed appreciably. The high proportion of child-bearing women among the English is a product of declining fertility in the past and the present ; the corresponding high ratio among us is an index of a large capacity to bear children in the future.

Comparisons in terms of broad age divisions of the kind we are using are, however, not completely satisfactory ; for the frequency of child-bearing among women varies considerably from age to age within the reproductive period and the distribution by age of reproductive women is as important as the proportion which they, in the aggregate, bear to the total population. The following table gives the distribution of

8. The ban on the remarriage of widows among Hindus accentuates the evil.

English and Indian women within the reproductive period in 1931 :

Women in five year age periods as % of all women in ages 15 to 45 :

Age Period

	15-19	20-24	25-29	30-34	35-39	40-44
England and Wales ..	17·6	18·3	17·6	16·5	15·5	14·6
India ..	20·3	21·2	18·8	16·4	12·7	10·6

We had higher percentages of our child-bearing women in the earlier periods than the English ; the first half of the reproductive period contained 60·3% in India as compared with 53·5% in England and Wales. This fact acquires significance when we note that in almost all populations the fertility of women is much greater in the first half than in the second half of their child-bearing career.⁹ Thus though we had a smaller proportion of women in the reproductive ages than the English population, the adverse effect of this on our fertility rate was probably more than balanced by the greater fraction of them that were in the more fertile phase of the period.

A more important factor than the age composition of our women is their civil condition. In 1931, 49·3% of all women in India were recorded as married, compared with 41·3% in England and Wales. We had a definite advantage over the English people in respect of married state ; a larger proportion of our women who could bear

9. Even in England and Wales where women begin child bearing at, by Eastern standards, high ages, the fertility of women aged 15 to 30 was in 1931 one-ninth again as large as that of women in the years 30 to 45, while in Travancore, a state in south-west India, the former was nearly twice as high as the latter.

children had acquired the opportunity to do so through matrimony.

The high percentage of married women in our population is the result of early and universal marriage. We are a much marrying people ; we marry early, and we marry in large numbers. Both these features of our matrimonial enterprise can be seen in the following table :—

Females unmarried per 1000 females in each age group in India in 1931

Age period	Unmarried per 1000 females	Age period	Unmarried per 1000 females
0- 5	969	20-30	44
5-10	802	30-40	17
10-15	609	40-60	11
15-20	148	60 & over	10

First, by the time the age period 40-60 is reached, only 1·1% of survivors remain unmarried. These probably consist of the unmarriageable residue ; for the percentage falls by ·1% only in the next age period. In England and Wales 13·6% of women were still unmarried at age 50 in 1930-32. Secondly, the ratio of spinsters declines rapidly with the advance of age. In the age group 10-15, 60·9% are spinsters, but in the next age group the proportion falls to 14·8%, and by the time the age period 20-30 is attained, almost every woman who can possibly marry has married. In the English population one-third of women in ages 25-34 are still unmarried.

The influence of marital condition on our birth rate becomes evident when we turn to the proportion of married among women in the child-bearing ages only.

In India 80% of those in ages 15 to 45 were recorded as married in 1931, in England and Wales only 50%, and of the married women in India in these ages 64% were in ages 15 to 30 in which fertility is high, as compared with 33% (approximately) in England and Wales.¹⁰ Thus the effect of the age composition of our women on their total fertility is reinforced by the distribution of married state among them. We have not only a high percentage of married among our women, but the married women are also favourably distributed by age from the point of view of reproduction.

The final factor that governs birth rate in a community is the frequency of births among women in each period. We have already noted that 1000 women in every age group or single year of age do not bear the same number of children. They are more prolific at certain ages than at others, and hence the total number of children that will be born to a collection of women in the reproductive phase of their lives is governed as much by the frequency of births among them at every age period as by their specific age structure. Unfortunately we possess scanty information on this very important aspect of our population. The available data relate only to Cochin¹¹ and Travancore,¹² two states in south-west India. These¹³ are given below along with data for England and Wales :

10. Married women in England and Wales were $2\frac{1}{2}$ times as fertile in the ages 15 to 20 as in the years 30 to 45. Similarly, the fertility of married women in Travancore was $2\frac{1}{4}$ times as high in the first as in the second half of the reproductive period.

11. D. Ghosh and Rama Varma—*A Study in Differential Fertility, Indian Population Problems*, edited by Prof. G. S. Ghurye, being the Report and Proceedings of the 2nd All-India Population and 1st Family Hygiene Conference, 1938, p. SA 41.

12. *Census of India 1931*, Vol. XXVIII, Part I, p. 153.

13. The Travancore rates are, however, calculated indirectly from the fertility rates of completed marriages only by the application of Taits law. Hence only Cochin data are used in our study.

Births per 1000 women in Cochin, and England and Wales

Age Period	Cochin (1936-37)	England and Wales (1931)
15-19	131	12
20-24	195	77
25-29	233	112
30-34	228	94
35-39	165	61
40-44	103	24
Total fertility	5,275	1,900

The English figures are on a much lower plane than the Indian.¹⁴ This is shown by the comparative values of their total fertility rates which are simply the aggregates of the fertility rates for individual age groups—multiplied, in our example, by five to take into account the fact that we are dealing with five year age periods. They, therefore, give us a measure of the rates at which 1000 women passing through the child-bearing ages would be replaced by sons and daughters if no one of these women died before she completed her forty-fifth year. The Indian rate was 5·3 compared with 1·9 in

14. The data for Cochin are used to represent conditions in India as a whole. This is not quite satisfactory. Cochin forms an extreme part of this vast sub-continent and social conditions there differ greatly from those that obtain in other parts of India. Nevertheless, Cochin figures are the only Indian data available to the public as yet, and it is safer to use them for all-India purposes than those of foreign countries like Ukraine or Japan. But this should stimulate us to collect similar data for other parts of India, a task which can be best performed by a special commission on Indian fertility and mortality. In 1931, the Census organization did carry out an enquiry into Indian fertility and a good deal of information was gathered. But the enquiry was not conceived to provide material for the construction of modern indices of population growth, viz., the gross reproduction rate and the net reproduction rate (See a paper on Indian Fertility Enquiry 1931, by the author in *Indian Population Problems*, being the Report and Proceedings of the 2nd All-India Population Conference 1938 edited by G. S. Ghurye).

England and Wales, which means that, on the assumptions made, an average Indian woman would leave more than 5 children and an average English woman less than 2 children to take their respective places in the community.

Secondly, the Indian specific fertility rates both rise and fall much less abruptly than the English. In England and Wales the highest rate was more than nine times the lowest. In India the ratio was less than $2\frac{1}{2}$ to 1.

These differences between the two populations are in part due to the varying proportions of married women that they contained ; in each age period much fewer English women were married than Indian, so that the fertility rates which are calculated with reference to all women, married, unmarried and widowed, were naturally lower for the former. It is, however, possible to eliminate the influence of this factor by restating specific fertility rates in terms of married women only. This is done below :

Specific fertility of married women in Cochin (1936-37),
and England and Wales (1931)

Children born per 1000 married women

Age Period	Cochin	England and Wales
15-20	224	372
20-25	249	267
25-30	253	187
30-35	246	127
35-40	182	81
40-45	120	33
Total fertility	6,370	5,335

The differences in total fertility of the Indian and the English population have now become much less than before. If all women in the two countries marry by age 15 and if no one of them dies before completing her forty-fifth year, the average Indian woman would give birth to between 6 and 7 children and the average English woman to nearly $5\frac{1}{2}$ children. The Indian woman is seen to be not so much more prolific than the English, inspite of our much higher birth rate. Indeed, when we take into account the fact that while in England and Wales contraceptives are in extensive use, in India they play as yet a small part in determining the flow of births, Indian women appear to be less fecund¹⁵ than the English.

From the total fertility rate we can derive another and more useful index of the reproductive performance of a people, viz., its gross reproduction rate. The gross reproduction rate is simply the total fertility rate divided by sex ratio at birth, so that in it we get a statement of the relation between a given number of mothers, say 1,000, and the number of daughters that would be born to them if no mother dies before she completes her fertility period. This is an illuminating relationship ; for it tells us briefly and directly the rate at which mothers would be replaced by daughters, the old generation by the new, if no woman dies before she reaches her 45th year.¹⁶ The gross reproduction rate of the population of Cochin was 2.5. Applying the fertility rates of Cochin to the Indian population and assuming a sex ratio at birth of 108 boys per every 100 girls born, we get a value of 2.3 for the gross reproduction rate of

15. By 'fecundity' is meant the potential biological capacity to bear children ; by 'fertility' the realized capacity, i.e., the actual number of children born.

16. If, for example, the gross reproduction rate of a population is less than one, no amount of reduction of death would enable it to escape decline, soon or late.

India.¹⁷ If no one of our women dies before she completes her forty-fifth year, we should increase by two and a third time in every generation of less than 30 years.¹⁸ The gross reproduction rate in England and Wales was only 0·93 in 1931-32, suggesting the failure or rather unwillingness of English women to bear daughters in numbers sufficient to replace them.

III

A population grows as the result of its reproductive activity ; every moment fresh additions are made to its number by the birth of new lives. On the other hand, some people at all ages are dying, including women who could bear children or bear more children than they have done. Thus mortality restrains and modifies the effect of reproduction doubly ; it reduces the addition to current number, and lowers future accretions to it by cutting down the supply of potential mothers. The incidence of mortality has to be studied in both these aspects.

The officially recorded death rate in this country was 24 per thousand of population in 1931 and 22 in 1939. These rates are, however, known to be understatements, and we should use in their place the death rate of the Life Table population. In 1931, the corrected death rate was 34 per thousand. This rate too is an estimate based

17. Some adjustment is made on account of the fact that actual birth rate in Cochin was higher than in India as a whole.

18. A generation is measured by the number of years intervening between the birth of the first daughter to the mother and that of the first daughter to the daughter. In western populations the length of the generation is between 28 and 30 years, in India where women marry much earlier and bear children earlier too, the length of a generation is probably somewhere about 23 years. Hence a given gross or net reproduction rate (See supra) would represent a quicker rate of expansion in India than in the West.

upon data that are themselves imperfect. But the actual death rate would seem to be nearer it than the officially recorded rate of 24 per thousand, and we shall assume a death rate of 30 per thousand for our study.¹⁹ The crude death rate in England and Wales was 12 per thousand for the total population of males and females and the corrected death rates were 17·0 and 15·9 for males and females respectively in 1930-32.

We have estimated a birth rate of 40 per thousand for our total population. Applied to the population of 338 millions in 1931 and 389 millions in 1941, it gives us a total of 13·5 million births in the first year and 15·5 million in the second. Roughly 14·5 million new lives came into existence every year in this country during the decade 1931-41. On the other hand, 11 million persons or thereabouts, were removed by death every year. Thus death has been a great solvent of the difficulties which our enormous births might otherwise create, removing the equivalent of three quarters of those that are born every year. But unfortunately this is not a solution which any civilized people could like. That persons born should die is inevitable and probably desirable in a world in which many people have standing room only. But it is still more desirable that if people are allowed to be born, as small a proportion of them as can be managed should die before their time. Arguing on a purely materialistic plane, if we want to grow at our present rate, we can achieve our objective more decently with both a lower birth rate and a lower death rate. We need not reproduce vigorously in order that we may die profusely. In 1911-13 Sweden had a birth rate of 24 per thousand and a death rate of 14

19. Moreover, our life table (1931) population contains higher proportions of persons in the ages in which death rates are relatively less high. It is likely that the corrected death rate for 1941 would have been lower than that of 1931. Our recorded death rate fell appreciably during 1921 to 1941.

with a net increase of roughly 30% in a generation, almost equal to the rate of growth that we experienced in the decade 1921-31. Yet what a difference in welfare in terms of human lives saved did the Swedish way of expansion imply !

We have not only a high death rate, but, as we can see in the following table, the distribution of our death rate by age and sex is also peculiar :

Deaths per 10,000 of either sex in each age group in India,
and England and Wales (1930-32)

Age Period (1)	India		England and Wales (3)		(3) as % of (5) (6)	(3) as % of (2) (7)
	Male (2)	Female (3)	Male (4)	Female (5)		
0- 1	1,844	1,671	722	549	304·4	95·5
1- 4	376	346	75	60	508·8	92·0
5- 9	100	99	23	20	495·0	99·0
10-14	63	63	15	14	450·0	100·0
15-19	89	106	25	23	460·9	119·0
20-29	95	119	33*	28·5*	403·4	125·3
30-39	126	113	42*	36*	369·4	105·6
40-49	187	163	78·5*	58*	281·0	87·2
50-59	318	283	161*	117*	241·1	89·0
..
All Ages	236**		119**		198·3**	

Certain features of our mortality conditions stand out clearly in the above table. In the first place, we have an all round heavy death rate. The rate is very high among first year infants, nearly a fifth of them dying

* Simple arithmetic average of 5 year figures.

** For males and females together,

every year. In the next age period 1-4, it comes down quickly, but is still, absolutely speaking, high, about 38 per thousand children dying every year. The lowest level is reached in the age period 10-14, when death rate descends to about 6 per thousand, after which it rises again. Secondly, our age specific death rates differ from those of England and Wales. We have a general rate twice as high as the English. But for particular ages the differences are much greater. In the age period 1-4 and 5-9, for example, the Indian rate is five times as high as the English. Our handicap is highest at the dawn of life, and contrary to general belief, it is not in the first year of existence, but in the years that follow up to the end of adolescence and even youth that we suffer most by comparison with the populations of Western countries. Thirdly, the relative movement of our male and female death rates is not the same as that of the English population. In England and Wales the female rate is consistently lower than the male, and the difference which is wide in early age narrows down in ages 10-29, to widen again with the advance of years. In our country, on the other hand, the female death rate is slightly lower than the male during infancy and childhood. But by age 10 the two are equal, and thereafter the female death rate remains above the male death rate up to age 30-39. In still higher ages, they change their relative position.

The odds are particularly heavy against women in the reproductive phase of their life. To the stress and strain of poverty are added the risks of motherhood, raising our maternal mortality to abnormal heights. In 1933 Sir John Megaw, Director-General of Medical Services in India, who surveyed health conditions in 600 villages scattered all over British India arrived at an average maternal mortality rate of 23·5 per 1,000 births. An enquiry conducted by Dr. M. I. Neal Edwards in 1936-37 in the city of Calcutta yielded one of 24·41 per 1,000 registered live births. Death among

mothers was eight times as high in India as in England and Wales where it was only 2·9 per 1,000 births.

The level and structure of our death rate are highly significant from the point of view of the biology and the economics of our population. They greatly restrain our power to grow and seriously impair our economic strength. This will be clear from the following table in which we follow the fortunes of a cohort of one thousand newly born lives of either sex as it moves up to higher and higher ages. English data are added for purposes of contrast.

Number surviving out of 1,000 born in India, and
England and Wales

Age	India (1931)		England and Wales (1930-32)	
	Males	Females	Males	Females
1	751	768	928	945
5	602	628	901	920
10	565	593	890	911
15	541	568	883	904
20	512	528	872	894
25	478	479	858	881
30	439	427	844	868
35	395	373	829	853
40	346	318	809	837
45	294	264	784	817
50	243	215	750	790
60	149	132	636	702
70	70	66	434	531

The figures tell their own tale. By the time the first year of life is reached in India, a quarter of the original batch has disappeared through the gate of death. By

age 5 the loss amounts to 40%, and when the 20th year is attained at which a person is ready to shoulder the responsibilities of life, only half of the group that started the journey of life together are pursuing it. By age 60, the age of retirement from active life, only 15% of the initial number is surviving. The English experience is on an entirely different plane. Only 10 persons out of every 100 born die in the first five years. After that the loss is very small; 87 persons compared to our 51 enter the age of 20 and 64 of them survive to the end of active career at age 60. The English population has a larger proportion of survivors at age 60 than we have at age 5.

The general implication of the comparison we have made is very clear; we, as a nation, are badly handicapped in the race of life by our mortality conditions. From the economic point of view, the manner of our growth involves an immense waste of national resources and productive capacity. First, we nurse, feed, clothe, house, and train every batch of newly born population only to lose 45% of them before they reach the age 15 at which they can make any contribution to national income. If the cost of maintaining a young person upto age 15 is assumed to be half that of an adult, we throw away some 22½% of our national income on rearing up persons from whom the community gets little or no return. The corresponding loss in England and Wales is 6½%. Secondly, out of every 1,000 born, in our population, only 541 survive to enter working life at 15. But by age 60 only 149 are living. Out of 45 years of working life theoretically available to each entrant into productive career, the average member actually gets only 30 years. In the English population the corresponding period is 40 years.²⁰

20. The influence of our specific mortality rates on the age composition of our actual population is seen below. English data are given for purposes of comparison.

Thirdly, our high death rate is inescapably associated with a high rate of morbidity. For one man who succumbs to a disease in a year there must be five to ten who suffer from it, so that the prevalence of sickness may easily be five to ten times as large as the incidence of mortality. It has been estimated that every year malaria takes a toll of 3 million lives in this country. If this is correct there will easily be another 15 to 30 million people suffering from it all over the country. Both the direct cost of maintaining and treating these people, and the indirect cost in the shape of labour lost must be enormous. Add to this fact the further loss

Percentage of males and females in different age periods in India, and England and Wales (1931)

Age period	Males	India	England and Wales	
		Females	Males	Females
-1 }	14·7	15·9	7·9	7·1
1-4				
5-9	13·2	12·8	8·8	7·9
10-14	12·0	11·9	8·5	7·6
15-19	8·9	9·4	8·9	8·3
20-24	9·1	9·8	8·9	8·6
25-29	8·6	8·7	8·5	8·3
30-34	7·9	7·6	7·5	7·8
35-39	6·4	5·9	6·7	7·3
40-44	5·5	5·0	6·4	6·9
45-49	4·2	3·9	6·2	6·6
50-54	3·3	3·2	5·8	6·1
55-59	2·3	2·3	5·2	5·2
60-64	1·8	1·9	5·1	4·2
65	2·1	2·3	6·7	8·1

The table shows clearly the character of our population in terms of its age composition. Ours is a young population with 39·9% of males and 40·6% of females in the ages 0 to 14. In the population of England and Wales the ratios were 25·2% and 22·6% respectively. On the other hand, we had only 9·5% of males and 9·7% of females in ages 50 and above compared with 22·8% and 23·6% respectively in England and Wales.

of efficiency that prolonged illness necessarily leads to. Those who survive the attack of the various fell diseases that are rampant in this country must continue to live on a low plane of initiative and working capacity. Death may be selective in the sense that it weeds out the weaker elements first; but it does not necessarily improve the quality of those who escape it.

From the biological standpoint too, the volume and the structure of our death rate are highly significant. In the first place, death cuts off a large proportion of our girls in the prime of life before they begin production while of those who enter the child-bearing phase, only a small fraction live through the whole of it. Out of every 1,000 girls only 568 reach the age 15 at which child-bearing commences for most women, and only 264 live to the age 45 at which reproduction ceases. In England and Wales 904 and 817 respectively live up to these ages. The average girl born in this country has only 13 years of reproductive life, the average English girl 26 years. Again, those who survive to age 15 in India have on an average 22 years in which to bear children ; the corresponding member of the English population will enjoy 29 years out of a theoretical maximum of 30 years. That we have higher birth and general fertility rates than the English people is in spite of our adverse mortality conditions. Secondly, the relatively heavy mortality of our women in child-bearing ages creates a shortage of partners for married life. It is true that many of our men meet this difficulty by marrying girls much below their ages. But given the mean-after-life-time of men and women in our country, this difference in the age at marriage of husband and wife itself contributes to the high proportion of widows among us.²¹ In 1931, 15·5% of all

21. The average difference in the age at marriage of husband and wife is probably of the order of eight years, though the margin must be wider in individual instances. The effect of this on the extent of

women were recorded as widows in India, the corresponding percentage in England and Wales having been 8·7. Again, the incidence of widowhood is fairly high in the reproductive ages; nearly a seventh of all women in ages 15 to 45 were in this condition in 1931. As the ratio of spinsters diminishes from 14·8 per 1,000 females in ages 15-30 to 17 in ages 30-40, that of widows shoots up from 34 to 212. It looks as if we push girls into matrimony only to fill in vacancies created by the exit of widows.

These are, however, only rough indications of the effect of mortality on the reproductive performance of our women. To get a comprehensive measure which summarizes the influence of both current fertility and mortality conditions we have to construct an index of replacement like the Net Reproduction Rate. The net reproduction rate is simply the gross reproduction rate modified to include the influence of mortality. In estimating the latter we assume that every cohort of 1,000 newly born females reaches the forty-fifth year without any loss of strength. We now give up this assumption and take into account the fact that as the cohort moves up to higher and higher ages, its number is reduced at each successive age by the hand of death, with a corresponding effect upon the total number of births that take place.

Applying the specific fertility rates of Cochin to the All-India Life Table female population in 1931, we get

widowhood can be easily seen. The mean after-life-time of an Indian girl at age 15 was 30·04 years in 1931. If she was married to a young man of 23, her husband's mean after-life-time would have been 27·71, i.e., her husband would die two years before her. If her husband's age at marriage were 25, the period of widowhood would increase by 3½ years. These are estimates for the average girl representative of an age group, and they should not be taken to mean that if the ages at marriage of husband and wife were the same, there would be no widows at all. The major factor responsible for extensive widowhood is, of course, the ban on widow re-marriage among Hindus and others.

a net reproduction rate of $1\cdot1$.²² The corresponding rate in England and Wales in 1930-32 was $0\cdot81$. The population of this country revealed a tendency to grow at the rate of 10% per generation, under the influence of its current fertility and mortality conditions. The English population, on the other hand, showed a definite predilection to decline at the rate of 19% per generation.²³

Since the net reproduction rate is simply the gross rate modified to include the influence of mortality, a comparison of the two rates gives us a measure of this influence. Our net rate was less than half our gross rate; we could realize less than half our capacity to grow on account of our unfavourable mortality conditions. In England and Wales, on the other hand, the ratio between the two rates was as 8:9, and the English population lost through premature death only a ninth of its power to expand. If Western nations are to-day threatened with race suicide it is because among them the will to

22. Alternatively, we can get a substitute reproduction rate of the same value by dividing the general fertility rate of actual population by that of the life table population.

23. It is necessary to point out that these rates do not represent the actual rates of change of the two populations in 1931. They stand for rates of change which these populations would attain if and when they approximate in age composition to their respective life table counterparts, i.e., when their age composition is determined entirely by current mortality conditions.

The Indian rate seems to be low in the face of actual rates of change at the last two censuses. This is probably due to the fact that the 1931 life table was constructed out of the age data of current and previous censuses when death rate was higher than in 1931 and not from the specific mortality experience of the year. The recorded crude death rate over the period 1901 to 1921 was about one and a half times as large as that in the decade 1921 to 1931. Even if we assume that the structure of our specific death rates did not change over the period, this should raise our net reproduction rate appreciably. Our current net reproduction rate is probably nearer 1·4 than 1·1. In 1925 Japan which had a gross reproduction rate of 2·5, an age distribution of women very much like ours, and a structure of specific fertility rates similar to that of Cochin, had a net reproduction rate of 1·6.

bring new life into existence has suffered atrophy. If Eastern populations do not grow as fast as they can, that is because they are still very much at the mercy of death.

A Note on the Technique of Measuring Population Growth

As there is in this country an imperfect understanding of the modern technique of measuring population growth, a short note on it may not be out of place here. The modern demographer has been, for some time, after an index of population growth more helpful than the survival rate, which is merely the difference between the crude birth and the crude death rate in any year. But these rates are themselves influenced by the age structure of the population that in its turn has been moulded by the movement of birth and death rates in the past. Thus the present survival rate reflects as much the influence of past as of present fertility and mortality conditions so that it is not possible to use it as an index of probable growth under the influence of existing fertility and mortality conditions alone. Demographers, however, want an index of change which would reflect the influence of present fertility and mortality conditions only, and in the search for such an index they have discovered the various replacement rates that we have made use.

The basic material for the construction of these rates is the age specific fertility rate of a population, i.e., the number of children born to, say, 1,000 women at each age or age period. Let us indicate these rates by $f_{15}, f_{16} \dots f_{45}$, assuming that reproduction begins at 15 and ends at 45. Then $f_{15}+f_{16}+f_{44}+f_{45} = F_{15-45} =$ total fertility rate, i.e., the total number of children that would be born to 1,000 women if they could all complete their fertility period. If we divide F_{15-45} by the sex ratio at birth $\frac{M}{M+W}$ we get the Gross Repro-

duction Rate $F_{15-45} \times \frac{W}{M+W}$, the number of girls only that would be born to these 1,000 women on the assumptions made. The gross reproduction rate, since it assumes that no newly born girl dies before she completes her forty-fifth year (death after that age does not matter), gives us a measure of the influence of fertility conditions untrammelled by the factor of mortality.

To get the net production rate we multiply each specific fertility rate by the proportionate number of females in the corresponding age of the life table of female population. By this operation we take note of the fact that only a portion of every 1,000 newly born girls survives to the particular age whose fertility rate we are using. If the proportion of females in age 15, 16....to 45 in the life table population are indicated by $l_{15}, l_{16} \dots l_{45}$, the net reproduction rate is equal to

$$(f_{15} \cdot l_{15} + f_{16} \cdot l_{16} \dots + f_{45} \cdot l_{45}) \div \frac{M}{M+W}$$

Obviously, in stating the net reproduction rate of a population we are stating the rate at which mothers would be replaced by their daughters if the actual population had the same age composition as the life table population, which would be the case when the age structure of the former is completely determined by current mortality conditions as shown in the life table. The net reproduction rate, therefore, represents not the current rate of replacement but the rate that would be realized if current fertility and mortality conditions persist long enough to make the age structure of the actual population conform to that of the life table population. The rate is, therefore, simply a measure of growth on certain assumptions and not a prediction at which the growth must take place. It is an instrument of statistical measurement rather than a statement of some biological law of growth.

PART II

POPULATION AND ECONOMIC ACTIVITY

I

Placed against the magnitude of our reproductive performance our economic achievement appears unimpressive. We are one of the poorest peoples on the globe, threatened by an influx of new lives on a vast scale. This is shown by our small *per capita* income. In 1931-32 the average Indian had an income of Rs. 65/- only, an amount much less than the incomes of peoples in advanced countries. This is made abundantly clear by the table below :

Per capita (annual) income in certain countries

U.S.A.	..	Rs. 1,406	France	..	Rs. 621
Canada	..	" 1,038	Germany	..	" 603
Australia	..	" 980	Japan	..	" 281
			British India	..	Rs. 65

The average person in the U.S.A. earned 22 times as much as the average Indian ; the average Englishman, 15 times and the average Japanese, 4½ times.

The figures in the table refer to money incomes. Real incomes, or the collections of goods and services that the money incomes could buy in the respective countries, did not probably differ as much. Nevertheless, the differences are too wide to be appreciably affected by divergences in the purchasing power of money, and we shall not be wrong in assuming that the relative heights of *per capita* money incomes in the several countries are a fair index of the comparative levels of prosperity their peoples enjoy.

II

Since income *per capita* in a community is an expression of the relationship between its total number and

its aggregate income, low average earnings can result only from a failure of the latter to keep pace with the former ; the factors that help to augment the national dividend must not be as powerfully operative as those which stimulate or facilitate the growth of number.

The first factor that influences the national dividend of a country is the size of its working population ; for though the whole population enjoys the fruits of national production,¹ it is only a section, those in the working ages, that is responsible for its creation. We shall assume the working age of our population to be from 15 to 60. In European populations it is taken to be from 15 to 64. The limits we have chosen for our population are not quite correct ; there are many persons beyond the upper limit who actively contribute to the nation's income and should be counted as workers. But their number, relatively to the total working population, must be small. Again, in a predominantly agricultural country like ours many persons begin productive work before they reach 15. But most of them are classified by the population census as working dependants² whose contribution to national income cannot be large.

Besides men, we have a large number of women engaged in production. In 1931, there were 465 women for every 1,000 men classified as workers in the Census Report. This proportion was determined by two sets of forces working in opposite directions. On the one hand, marriage is universal and early in our country, and the natural effect of early and universal marriage is to withdraw many women from the field of economic em-

1. The size of the national output in the short period is, however, intimately affected by the relation between the demand for consumption and the productive capacity of a people.

2. There is no clear-cut, consistent definition of 'working dependant' in the Census Report. The term, however, seems to refer to persons who are engaged in work, but are, in part, dependent upon 'earners' for their living.

ployment. On the other income per family is low, and a good proportion of our womenfolk engage in productive work to eke out the meagre earnings of male workers. However, the largest section of our women workers employed in agriculture, and work on the farm, specially the family farm, can be adjusted without difficulty to the exercise of the reproductive function. In England and Wales, there were 423 female workers for every 1,000 male workers in the population in 1931. But most English women workers were engaged in non-agricultural work, and more than half of them were between the ages 18 and 34 suggesting the exodus of large numbers from productive employment after marriage. For women in non-agricultural employment there is a conflict between reproduction and economic activity which they can resolve by giving up the one or restricting the other. But this conflict does not exist in our country, at least for the vast number of women engaged in agricultural work, and our women continue to work as long as strength permits, retiring temporarily to meet the demands of child-bearing.

However, though women workers were nearly half as numerous as male workers, their aggregate contribution to national income was probably very much less. In the first place, in 1931 about 3 out of every 7 women workers were classed as working dependants. Secondly, in occupations in which both men and women were employed, the earnings of women workers were much lower than those of men. Finally, there was a great preponderance of men in the more lucrative avenues of employment. We should bear these facts in mind when we consider the size of our working population as one of the factors that govern the size of our national dividend.

In 1931, 44% of our aggregate population was enumerated as workers. In England and Wales occupied persons were 47% of the total population. The higher English percentage was, in the main, due to differences

in the age composition of the two populations ; compared with the English we had a lower proportion of persons in the working ages. To take males only, in India males in ages 15 to 60 were 57% of the total male population, in England and Wales they were 63%. If we extend the working age of the English people to 64, the percentage would rise to 68. We are thus handicapped by the age composition of our people ; our productive section forms a smaller part of the total population which it has to support. Equally significant is its distribution by age within the working period. Out of every 1,000 males born in our country, 541 survive to enter the working age at 15. But by age 60 only 14 are still living. Thus as a result of the structure of our specific death rates, the average person who reaches the age 15 can expect to get only 30 years of working life out of a theoretical maximum of 45, while an Englishman in the same category has an expectation of 40 years. We have both a smaller proportion of persons in the working age and a shorter period of working life available to each person who reaches that age.

III

The second factor that determines national income can be broadly described as the effectiveness of productive effort in the community. But since the return to effort differs from occupation to occupation, the level of income per head of all workers depends as much on the distribution of workers among different occupations as on output per worker in each occupation. We shall consider these aspects of our economy, one after the other.

The various occupations which people in this country pursue can be divided into three broad groups : agriculture and the allied industries of fishing, hunting etc.; mining and industry ; and trade, transport and other occupations mainly concerned with the supply of services. The following proportions of our working population were enumerated under these three classes in 1931 :

Per cent of all workers in different occupations

	India 1931	England and Wales 1931	Japan 1930
1. Agriculture, Fishing, Hunting ..	67·1	5·7	50·30
2. Industry and Mining ..	10·2	45·3	19·50
3. Trade, Transport, etc. ..	22·7	49·0	30·20

The occupational distribution of our workers differs greatly from that of the other countries for which also information is given in the table. Compared with Japan and still more with the U.K., we had a high proportion of workers in agriculture and a small fraction in industry. Now this should be of no consequence, if farming were as remunerative as other occupations. In fact, however, in almost all countries income per worker is lower in agriculture than in industry or trade and transport, a rule to which our country is no exception. In 1931-32 the average worker in agriculture in India earned Rs. 86/-, in industry and mining Rs. 192/-, and in trade and transport Rs. 305/-.³ The corresponding real incomes probably differed less, but they would still be significantly unequal.

Given these differences in earnings from agriculture and other occupations, we with a high proportion of workers in agriculture, must put up with a low income per head, and this occupational congestion, whatever its remedy, has its origin in the failure of our economy to adjust itself to the rapid growth of our number. In the first place, our agricultural community has expanded mainly by internal growth, though the decay of rural industries has made some contribution. The 1931 Census enquiry into fertility showed the same numbers of children born and surviving per family among far-

3. V. K. R. V. Rao, *The National Income of British India 1931-32*, p. 187. The values are extremely rough.

mers as among other occupational groups.⁴ Secondly, Indian farming has not been subject to any revolutionary change in technique, which reduces the demand for farm labour. It follows to-day the same technique that it has done for hundreds of years, so that the size of the agricultural community has been determined mainly by the food requirement of a growing population. We could have possibly escaped agricultural over-population, if we had an industrial revolution to synchronize with the establishment of those conditions of life that made rapid growth of number possible. But it is doubtful—leaving aside foreign rule—whether we had the historical antecedents for such a revolution.

A similar argument applies to the mass of our industrially engaged population. We have in this country two industrial systems : the one dominated by large-scale organized industries carried on in factories and workshops and the other made up of innumerable cottage and small industries located in villages and towns. 90% of our total industrial population was engaged in cottage and small industries and only 10% in large establishments, so that the earnings of the former greatly influenced the income of the average industrial worker in the economy as a whole. And there are evidences to show that, in general, the earnings of the cottage worker are much lower than those of the factory employee. For example in Bombay Presidency in which both cottage and small scale and factory industries are well developed the average monthly income of a worker in the former seldom exceeded Rs. 15/- in 1936-37—

4. The data are as follows :

	No. of children born per family	No. surviving
Agriculture	.. 4.40	3.07
Industries	.. 4.20	2.89
Others	.. 4.05	2.86

for most workers, the level was much lower—while the average earnings of workers in all organized industries was Rs. 27/- per month. The factory employee earned nearly twice as much as the worker in cottage and small industries. We have again a relative over-population in cottage and small industries with more or less the same historical explanation as in the case of agriculture. We have grown faster than the speed with which the structure of our economy has changed. .

IV

The first problem connected with our population is, therefore, its occupational maldistribution ; income per head of all workers (and per head of population) is low, because there are too many people in avenues of employment in which the return per worker is lower than elsewhere. This is, in part, a logically separate problem from that of the absolutely low productivity of workers in all occupations, and we may continue to be a poor people even after the proportion of men and women engaged in industry and trade and transport has increased at the expense of agriculture and allied occupations. It is, therefore, necessary for us to investigate the causes of our all-round ineffectiveness. For reasons which should be obvious to the reader, we shall discuss this question only in so far as the factor of population bears on it. There are other causes, but we shall concern ourselves with them only to the extent that they influence or are influenced by the size of our population.

To take up the output of the industrial worker first. In general, the Indian factory worker produces less per unit of time than the worker in the West or in Japan.⁵

5. Comparisons of labour efficiency in different countries or even in different industries within the same country are always risky. However, vide Buchanan, Daniel H, *The Development of Capitalist Enterprise in India*, ch. XVI. re: the output per head of Indian and foreign factory workers in a number of important comparable industries.

This is, in part, due to the quality of the worker ; the Indian worker is poorer in physique and skill, and less adjusted to work in factories than his counterpart elsewhere. But another part of the explanation lies embedded in the character of our industrial structure and the stage of our industrial development. Various factors influence these and thereby determine the return to human effort in industry. But of these two seem to be more important than others, viz., the fiscal policy of the State and the composition of our economic resources, human and material.

The industrial development of this country has been greatly influenced by the fiscal policy of the State. Until recently Free Trade and *Laissez Faire* seriously circumscribed for us the opportunity for economic experiment which England owed to her early start and other countries to their protective tariff. But within the limitations imposed by fiscal policy, our industrial growth and structure have been determined by the relative supplies of different factors of production. An industry is, after all, a way of producing certain goods or services, and those industries naturally come into existence and flourish in a country which the conditions of cost, governed by the relative supplies of different agents of production, favour. We have in this country an abundant supply of unskilled labour ; to-day our factories can recruit all the labour they want at their gates. We also possess various natural resources that are large both absolutely and in relation to the stage of our industrial development. On the other hand, our natural resources are not copious relatively to the size of our population and, contrary to popular belief, our industrial potential appears to be much less than that of the U.S.A. or the U.S.S.R.⁶ We have, again, a limited supply of capital available for industry ; a good propor-

6. For comparative data vide *Industrialization and Trade* by A. J. Brown, Tables I and II on pp. 18-19 and 21 respectively.

tion of our domestic capital is employed in trade and finance, and foreign capital which has flowed into the country over a century has gone mainly into public utilities, foreign trade and a limited number of fields in which it has built for itself a lucrative monopoly. Finally, with wide-spread illiteracy and emphasis on liberal education we suffer from a short supply of skilled labour.

These facts give shape to our industrial structure and determine the output of our industrial worker. In the first place, the growth of large-scale organized industries is still extremely limited in this country. In 1931, 1·5 million persons or one-tenth of all industrial workers were employed in large establishments. But the industrial workers themselves were only one-tenth of all workers, so that those who worked in factories constituted only 1% of the total working population. Secondly even the so called large establishments are often incompletely 'factorized'. A large establishment is defined as a place of work in which 20 or more persons are employed and/or mechanical power is used. This definition, while suitable for the purpose of administering the Factories Act, does not enable us to gauge the degree of 'factorization' that our industrial system has undergone. Many an institution that comes under the definition is hardly a factory in the sense in which we ordinarily understand the term. For example, a merchant employer may bring together 20 or more persons in a central shop in order to meet the demand of a growing market and to secure supervision over quality of product and time of delivery. Such an establishment would be a factory according to official definition. But it will have few of the important characteristics of a modern factory. The amount of capital per worker would be small; no power machinery may be used and there may be no division of labour, each worker or set of workers working independently and on all processes which are carried on in the establishment. We have no information about the proportionate importance of or-

ganizations of this and similar types. They have nearly disappeared from among our major organized industries. But they are still important in a large number of minor industries and probably in the aggregate increase substantially the number of persons who are recorded as employed in large establishments. Now there is nothing wrong with such institutions ; in fact with the relative supplies of labour and other factors of production being what they are in our country, these industrial forms are, for the entrepreneur, more efficient or cost saving than fully developed factories. But for exactly the same set of reasons, output per worker in such organizations is, in most cases, lower than in full-fledged factories.

We have, secondly, in our industrial system a preponderance of consumers' goods industries, in which capital per worker and the degree of skill required are both low. It is not possible to make a clear-cut division of our industries into consumers' goods and producers' goods industries, but a rough idea is given in the following table :

Percentage of all industrial workers engaged in different group of industries in India in 1938 and in U.S.A. in 1937.

	India	U.S.A.
Textiles	..	49.59
Gins and Presses	..	10.11
Food, Drink and Tobacco	..	13.89
Paper and Printing	..	3.18
Engineering	..	12.60
Minerals and Metals	..	3.05
Chemicals and Dyes	..	1.03
Wood Stone and Glass	..	2.78
Others	..	3.87
	<hr/>	<hr/>
	100.00	100.00

The textiles, gins and presses, and food, drink and tobacco groups taken together employ nearly three-fifths of the total labour force in organized industries. The relative unimportance of the industries connected with engineering, minerals and metals, and chemicals and dyes is equally patent. Probably if railway workshops and a few big iron and steel manufacturing concerns are taken out of these groups, they would have a preponderance of small organizations—small workshops engaged in repair work, small foundries manufacturing elementary goods from imported basic materials, etc. Again, there is nothing wrong with these lightly organized industries ; they may be as efficient in their own spheres as those which manufacture heavy producers' goods on a large scale. But they employ less capital and in general produce less value per worker. We have, it is true, a number of heavy industries. But these are concerned with the processing of bulky materials of domestic origin, in which the weight of the raw material in the finished product decides the location of the enterprise. Some of them, e.g., the iron and steel industry, are as heavily capitalized as their counterparts in advanced countries, but, in general, they are still limited to the manufacture of the simpler products and the carrying out of the simpler processes in which the skill factor is less important. Finally, our industries seem to be, generally speaking, less highly capitalized than the same industries in the industrial West. In coal mining, for example, according to Buchanan, 'a number of mechanical coal cutting, handling and hoisting machines have been introduced, but their use is still limited, since only 15% of the Indian coal is mechanically mined as contrasted with 75% of American bituminous coal so worked'.⁷ In the cotton textile industry again,

American mills produce lower count yarns and early took to the ring spindle which is much better suited not only to that type of work,

7. Buchanan, op. cit., p. 362.

but also to labourers of low skill. Moreover, its product is like 40% greater. But although India was producing much coarser yarns than America, she stuck to the mule spindle much longer. And whereas in the United States most looms are automatic, only since the World War have they come into common use in other countries.⁸

Indeed, it would be unusual for industries in a country like India to be as highly capitalized as corresponding American industries. The explanation lies in the abundant supply of labour that we possess and the relatively small quantity of our capital resources. As Buchanan says, 'In America machinery is relatively cheap and labour dear ; therefore, the best results are obtained by supplying large amounts of machinery to labour.....In India conditions are reversed. Labour is cheap and machinery relatively dear ; therefore, the best results are obtained by applying large amounts of labour to a single machine'.⁹ Here the 'best results' spoken of are those for the entrepreneur ; he cuts down his costs by selecting labour-using methods in preference to capital-using ones. But the results for the economy as a whole are poor ; the low amount of capital employed per labourer reduces output per head and lowers national income, and the low wage, in its turn, reduces the efficiency of the worker, and discourages the employment of capitalistic processes.

V

More important than factories and large establishments as fields of employment in our country are cottage and small industries which engage 9/10ths of our industrial labour. But output per head is low in these industries, and the average cottage worker enjoys a standard of life even lower than that of the average farmer. This explains, in part, the steady influx of artisans into the category of farmers and agricultural workers. The occupational statistics of 1931 Population

8. Buchanan, op. cit., pp. 204-205.
9. Buchanan, op. cit., p. 378.

Census, for example, show that nearly half the total number of persons who are by caste non-farmers have given up their traditional callings, while a good part of the other half retained them as subsidiary occupations only.

Our handicrafts suffer from low physical efficiency and low demand for their products. In the first place, many of them are badly equipped, working with primitive tools and instruments, and though the personal skill of the worker, inherited from the past, is often of a high order, it is hardly sufficient to offset the handicap which other factors impose. Consequently output per worker is small, and even a full-time artisan turns out much less value in a unit of time than the average worker in a factory producing competitive goods. The craftsman, it is true, is often at the mercy of the middle-man seller, or employer seller, who takes advantage of the former's lack of resources and ignorance of market conditions in every possible way. But it is doubtful whether the artisan could earn as much as a skilled factory worker, even if he received the whole value of his product. That cottage industries survive in the face of competition from mills or factories may not then be due so much to their efficiency as to the fact that craftsmen must, in the circumstances of the economy they belong to, accept low rewards for their services.¹⁰

Secondly, the type of product turned out by cottage industries and the prices at which they are sold are governed by the taste and the level of income of the purchasers whose wants they satisfy. Historically cottage industries are relics of a simple but integrated economy in which the prosperity of the rural artisan depended upon that of the farming community. That

10. This is not peculiar to our country. In Japan, the land of successful small scale enterprise, workers in cottage industries enjoy lower living standards than factory workers. 'Labour conditions in small industries are liable to become sweated' says Uyeda, *Small Industries of Japan*, p. 5.

economy is disintegrating, and its parts are being re-integrated into a new pattern in which factories replace cottage industries more and more. The farmer finds it increasingly convenient to buy the products of mills and factories rather than of the village loom or the village smithy.¹¹ But as output per head is much higher in the former than in the latter, for each worker that finds employment in a factory several workers in cottage industries lose their jobs and swarm into agriculture. The progress of organized industries inevitably reduces the value of the products of rural industry, depresses the income of the cottage worker and pushes him towards farming.

VI

But farming in India is not a prosperous enterprise either. In 1931, income per worker in agriculture was only Rs. 124/-. The corresponding figures for countries like Australia or New Zealand were incomparably larger, and even in a country like Japan where agricultural congestion is intense the value of net output per worker was more than three times as large as in this country.

11. A similar fate has overtaken some of our artistic handicrafts. Popular taste is moving away from the products of cottage industries to factory-made substitutes. The intimate connexion between the way of life of a people and the pattern of its economy is seen in the following statement regarding Japanese cottage industries. 'The crowds of men and women, mostly dressed in western costume, coming out of the Tokyo Station every morning and evening...give the appearance of a thoroughly modernized society. But when they go home in the evening, they live in small wooden houses each with a small garden, in a manner not much changed since the beginning of the Meiji. They want to wear Japanese clothes, and eat and drink what their parents had been accustomed to consume. In order to cater for their requirements, which are so varied and so difficult to standardize, there must be a variety of trades and crafts which cannot be easily replaced by any one large organization' (Uyeda, *Small Industries of Japan*, p. 11).

How is the low productivity of Indian agriculture connected with the size of our population? Output per worker in farming depends upon a variety of factors : the amount and quality of other agents of production, viz., land and capital, that are used conjointly with labour, the technique of cultivation, the enterprise of the producer, and finally, the character of farming itself, i.e., the proportion of live-stock to arable culture and the combination of crops produced. Probably, the most important of these determinants of agricultural productivity is the man-land ratio, the amount of cultivated land per worker.¹² In 1931 there were 66½ million workers in agriculture, comprising cultivating owners, tenant cultivators, and agricultural labourers, while the total amount of land available for cultivation was estimated at 362 million acres, so that the amount of land per worker was 5½ acres. This is an average for a vast area over which conditions differed greatly from region to region. In most areas more than 70% of all farms were less than 5 acres each, and a smaller, but still a good, percentage less than one acre each. For example, in Bengal, according to data collected by the Land Revenue Commission of 1939, the average (net) cultivated area per head of agricultural population was less than an acre, and 46% of farming families had less than 2 acres each. Obviously, the amount of land per

12. This ratio is much better than the common index of density per square mile, which is based upon the total area of a country irrespective of the percentage that is suitable for human settlement. But it is not wholly satisfactory. 'The carrying capacity of a country cannot be measured by field crops alone. Pasture land and forests must be added to mineral, climatic and human resources and geographical location (access to the sea with its riches of fish and access to trade routes.)' 'It would be ideal of.....the ratio of population to all these physical, economic and human factors could be determined. Our statistical methods, however, are not sufficiently refined, and we can only determine a ratio of man to cultivated land, or a ratio of cultivated to total area' (E. W. Zimmerman,—*World Resources and Industries*, p. 124).

worker is too low to employ him adequately so that output per head would be small, even if the land were highly productive, and however high the output per head, a good proportion of farm workers must be under-employed.

But output per acre is not high in this country. Some figures given below illustrate this point :—

Approximate yields of Rice and Wheat in some countries of the world

	(lb. per acre)				
	India	Siam	U.S.A.	Italy	Japan
Rice (average 1931-32 to 1935-36)					
	..	829	961	1,333	2,797
Wheat (average 1924-33)	636	714	846	980	1,146

Our yields are sometimes as low as 40% of those of other countries. The proximate causes of this phenomenon are : primitive technique of cultivation , low capital investment ; and unsatisfactory conditions of land tenure.

The technique of cultivation in India is simple, primitive and cheap. But experts who have studied Indian farming have borne testimony to the skill and intelligence with which the Indian cultivator applies it. In 1889 Dr. Voelcker, consulting Chemist to the Royal Agricultural Society in England, who was invited by the government of this country to report on the ways of improving Indian agriculture wrote, ' Certain it is that I, at least, have never seen a more perfect picture of careful cultivation combined with hard labour, perseverance and fertility of resource than I have seen at many of the halting places in my tour '. Nearly 50 years later Sir John Russell, another expert of international repute said : ' The Indian ryot compares favourably with any of the peasant populations I have met in different parts

of the world'. These quotations are not intended to suggest that there is no scope for further improvement of Indian agricultural practice. Far from it; they only imply that the major explanation of our low agricultural output must be sought for in the circumstances which compel the Indian farmer to use primitive technique rather than skill and enterprise with which he applies it.

The poor yield of our farms is, in the next place, the result of low capital investment. Investment of capital by the farmer himself is, in many parts of the country, extremely small, the chief reasons being the poverty of his own resources and the high price at which alone he can borrow them from others. The amount of land possessed by him is so small and the yield from it so meagre, that he has no surplus left for investment in land, after he has met the consumption needs of his family and the requirement of his farm for working capital. One of the virtues of peasant farming is supposed to be that the peasant's savings go to improve his holding through investment in cattle, manure, seed, etc. But the income from a farm of average size in this country is so low that not only is no capital put into the land, but the farmer often lives on the original endowment of the land itself. Farming in India has become a sort of marginal enterprise; the farmer takes out of the land only the bare minimum, because he is not in a position to put back anything substantial into it. 'The extra crop in England,' says Dr. Voelcker, 'is.....the produce of what is added to, and not, as in India.....of what is taken out of it.'¹³ And his poverty has taught the Indian cultivator to be most economical with the resources that nature supplies him. According to Howard,¹⁴ he does more with a little nitrogen than any farmer in the world

13. Voelcker, op. cit., p. 41.

14. Sir A. Howard,—*An Agricultural Testament*, p. 210.

outside China. In the 19th century economists praised the careful economy of the small-scale industrial producer. People now admire the cautious husbanding of his scanty resources by the small-scale Indian farmer. But in both instances economy and caution are an index as much of the poverty of the producer as of his intelligence and enterprise. The Indian farmer uses his supply of natural nitrogen carefully, because he lacks funds to buy manures and fertilizers that can re-endow his land with chemical elements lost through farming. In 1930-31, nearly a fifth of our land under cultivation was current fallow ; fields were taking rest to regain their natural fertility.¹⁵

15. It is not possible, in the absence of soil survey—a long overdue measure in a mainly agricultural country—to say whether our farm lands are showing diminishing returns or not. According to the Royal Commission on Indian Agriculture, an overwhelming proportion of the agricultural lands of India long ago reached a condition of stability. On the other hand, all general considerations suggest that they are either already subject to the law of diminishing returns or pretty near the point at which the law operates. 'In the first place, it must be accepted as an axiom that in agriculture that which is taken off the land in crops must in some way be put back into the soil, or else the soil will suffer exhaustion' (Voelcker, op. cit., p. 39). And it is known that the Indian farmer is not in a position to do this. Secondly, in spite of the increasing use of improved seeds, the yield per acre does not seem to improve permanently. This may be due, in part, to the tendency of the farmer to underestimate his gains, but it is also in some measure the result of improved seeds failing to maintain their high yield for long. According to Howard (op. cit., p. 184) 'In cotton, jute, rice, grasses and clovers and many other crops old varieties are being systematically replaced. Nevertheless, the gain per acre obtained by changing the variety is as a rule small.' It has been a common experience that after a few years the yield per acre from improved varieties begins to decline rapidly. Thirdly, the condition of stability mentioned by the Royal Commission has been achieved at the expense of output. 'The real answer to the question whether the soil in India is being exhausted or not seems to me to lie in the fact of the small produce annually removed.were demand, however, made upon the soil for a greater yield, the soil could no longer supply it....' (Voelcker, op. cit., p. 41). The state of constant returns in Indian agriculture thus represents a precarious balance between the capacity of the soil to produce and our

Secondly, the great demand for land from people, most of whom have no alternative source of income, has driven up the price of farm land out of relation to its income-earning capacity. In many parts of the country farming is a deficit undertaking. Yet the value of land rules high, because the mass of the people must have some land if they are to subsist at all.¹⁶ This is extremely unfortunate, for the high price of land absorbs a good proportion of the farmer's capital resources leaving him a residue that is hardly sufficient for its improvement or efficient operation. Hence the Indian farmer relies as much as possible on human labour and on poor cattle that costs him little to maintain, uses the simplest and the cheapest implements, draws as much as he can on the natural fertility of the soil and secures from his enterprise a yield that keeps him and his land on the margins of subsistence.

A third cause of low capital investment in Indian agriculture is the high rate of interest that prevails in rural areas. This is due, on the side of supply, to a real shortage of capital and to monopolistic control of that short supply, and, on the side of demand, to intense competition for consumption loans and high demand for

demands on it. We are maintaining its fertility by drawing upon it only to the extent that it can be restored by the operation of natural forces, and any attempt to increase the yield without a corresponding increase of investment will upset the balance and bring the law of diminishing returns into vigorous operation. Finally, in dealing with population pressure it is necessary to take a comprehensive view of the law of diminishing returns. It is not just a question of the return to amounts of other factors of production used per unit of land viewed in respect of individual farms; it has to be visualized as a pervasive pressure on the general framework of the agricultural economy of the country. From this standpoint the increasing conversion of forest lands into arable fields in our country, soil erosion, and deterioration of agricultural yield over large areas must be regarded as manifestations of the operation of the law. And in this view of the law, Indian agriculture is already subject to it in many regions.

16. The high price of farm land in India is thus an index of population pressure rather than of agricultural prosperity.

liquidity in rural areas. Rural India imports little capital, if any, from outside; indeed, the commonly held opinion is that it sends out more than it receives.¹⁷ It must, therefore, rely upon its own resources for the supply of its capital needs. But its own resources are meagre: a low gross income, the major portion of which must be used to maintain consumption and a minimum flow of working capital for farming and other rural enterprise, leaves a very small surplus for long term productive investment in agriculture. And that small surplus is effectively controlled by a minor percentage of money-lenders and rich farmers to raise the rate of interest to heights that has no relation to the income-producing capacity of rural enterprise.¹⁸

On the side of demand the high price of capital in rural India is caused, first, by an intense competition for consumption loans. Consumption loans originate in the poverty of the farmer, and the uncertainty and unevenness of his income-stream, while demand for con-

17. Farming is in our country almost entirely a one man industry. The worker, the capitalist and the entrepreneur, all wear the same hat. There is no specialization of functions within it and no one can enter it whose resources as a capitalist are not supported by his ability as a farmer. Hence agriculture cannot import capital unless it can attract enterprise too. Obviously, there can be no scope for enterprise in small-scale farming while, except in the case of plantation crops, the possibilities of large-scale farming in this country still remain largely unexplored. The attempt to create pockets of capital accumulation and enterprise within Indian agriculture by Permanent Settlement measures in Bengal and adjoining provinces has failed miserably.

18. It is common to consider the village moneylender as an accidental phenomenon, who can be eliminated by some minor adjustments of our rural economy. In fact, however, he is an inevitable component of an economic system in which the poverty of the farmer promotes the profitability of money-lending. For while the profits of farming depend on real productivity, the profits of money-lending are, within fairly wide limits, determined by the degree to which the farmer can be squeezed and to a point the poorer the farmer the more he can be squeezed. Hence money-lending flourishes, even though farming decays in our country.

sumption is inelastic, and the person who borrows for immediate consumption discounts the future heavily. Secondly, the prospect of rising land values that a continuous increase of population pressure keeps alive, raises the liquidity demand for money in rural parts; a certain proportion of the limited capital resources of the rural community is maintained in liquid form in order that land may be purchased at the opportune moment.

Finally, the low physical productivity of Indian agriculture is, in some measure, the outcome of the unsatisfactory terms on which land is often held by the actual cultivator; and for this too the intense pressure of population is partly responsible. In some places, an increasing demand for land has raised the level of rents and led to rack-renting in various ways that successfully evade rent laws. This is illustrated in the following statement of the Rent Commission of 1880:

In Behar the population had come to press closer upon the land than in Eastern Bengal. The landowners accordingly had the advantage in the former province and were able to push rents up to a point which leaves the cultivator but little above subsistence, while in the latter part of the country, unclaimed land being abundant and cultivators scarce, the ryots had the advantage and were in consequence able to procure land on very favourable terms.

Rent laws have in recent times considerably restrained the evil of rack-renting. But they have not removed the basic cause from which it arises; on the contrary, they often force it to seek new channels of expression.

Secondly, inordinate land hunger has caused an increase in the number of intermediate tenures¹⁹ tenants-at-will and crop-sharing tenants. Sub-infeudation is a

19. The intermediate tenure holder is like the bond-holder of a joint stock company, interested, only at the second remove, in the welfare of the property from which his income is derived. His immediate concern is to obtain his dues from the tenure holder below him, and he will enforce his claims without reference to the capacity of the farm from which, in the final stage, the succession of incomes is drawn. His relations with the peasantry are fiscal rather than manorial.

natural product of population pressure ; more people want land as a source of living than can be comfortably accommodated on it, widening by their competition the margin between its gross output and the share of the final cultivator, which is then parcelled and distributed as intermediate rights to a long chain of mere rent receivers.

The evil of sub-infeudation¹⁹ is loudest in the permanently settled areas of Bengal and adjoining provinces where the claims of the State on the zamindar have been fixed in perpetuity, while income from land rises with the growth of population and the general development of the economy. But it has also appeared and is on the increase in ryotwari areas where the 'ryot' pays revenue directly to the State. Here it takes the form of sub-letting by the ryot, and is growing apace in the cotton tracts of Bombay, Central Provinces and Berar where sub-rents are sometimes 8 to 10 times as high as the rent paid by the ryot. Here too the fundamental factor in operation is population pressure, the competition of people with extremely limited opportunities of alternative employment to take land on any terms and at the cost of their own living standards.

Similarly, the system of crop sharing is spreading fast under the influence of insistent demand for land. In the less thriving districts of Bengal, for example, money rents are being superseded by produce rents, reversing the tendency which prevailed during the greater part of the 19th century, and testifying to the increasing intensity of competition for land. Produce rents are twice as high as money rents, and no one would take land on the former basis, unless he was compelled to do so.²⁰

20. The landlord's preference for the crop sharing tenant is easily understood. Not only does he get more from him than from the cash paying tenant, he can treat him as a tenant-at-will whose claim to remain on the property can be profitably examined from season to season,

These forms of tenure and the relationship of tenant and landlord they represent produce disastrous effect on the efficiency of our farming. The social injustice of rack-renting is patent. It deprives the tiller of the soil of his proper share, leaves him a net income nearly as low as the earnings of the mere labourer and removes all incentive to carry out improvements on his farm. The opportunity to rack-rent is bad for the landlord too. Human nature being what it is, the landlord, who can secure his income by rack-renting, loses the urge to achieve the same end by productive investment in his property. And this opportunity to earn easy income from rent has encouraged trading and money-lending classes to purchase land and become landlords with consequences unfavourable to agricultural enterprise. In the eyes of these people who lack the traditions of the agricultural community, the function of the landlord is to manage his tenants and exact as high a rent as he can rather than increase gross returns by judicious investment in the property. Similarly, crop-sharing tenancies suffer from serious defects. Like other short period leases they positively discourage durable investment in land by the tenant, and as the rent payable by the tenant is a function of the yield and price of the crop, he will push even non-durable investment only up to the margin at which the net return, assuming his share to be half, is twice as high as the cost incurred. In technical terms, the output of a crop-sharing farm would be about one half of a similar farm owned and operated by the farmer. We are thus losing a good portion of our possible income from agriculture, chiefly because the pressure of population has encouraged forms of tenure that work against the full utilization of land.

VII

The pressure of population has not only depressed the physical productivity of our agriculture; it has also adversely affected its character and the money return

obtained from it by our farmers. The character of farming in an area is governed by physical and economic factors. Soil, climate, rainfall and water supply lay down the broad lines on which it must develop. But within the limits set by these natural factors, the farmer can adjust his enterprise to his economic resources and opportunities. For the Indian farmer, however, both these are extremely limited; he has an inadequate supply of land and capital, the two economic agents that matter most for farming. He cultivates an extremely small farm, and can use only a meagre quantity of capital. He must in consequence go in for the type of farming which yields the highest physical output per unit of land cultivated and calls for little or no investment of capital. In general the yield per acre is higher in arable cultivation than in live-stock farming²¹ and the former can be carried on with much smaller resources too. Indian agriculture is, in consequence, almost wholly arable farming, and except in limited areas in the Punjab, live-stock farming is conspicuous by its absence. We have, it is true, a large supply of cattle ; indeed we possess the largest cattle population in the world. But 60% of them are employed as draught animals and of the residue only a small proportion receive the care and attention which is proper to dairy cattle. How poor we are in respect of dairy cattle is seen from a comparison with other countries.

Denmark has an average of about nine cows per holding and the United States about twelve. In Great Britain dairy herds average about 25 per head, a figure also shown by New Zealand. India presents an entirely different picture. The typical cultivator possesses a pair of bullocks with one or at the most two cows (usually of a draught or non-descript breed) and perhaps one or two buffaloes for milk production.²²

21. It is said that 'To produce 1,000 calories in the form of milk requires from twice to four times as much land as to produce 1,000 calories in the form of wheat or rice' W. R. Aykroyd, *Nutrition*, pp. 20-21, Oxford Pamphlets on Indian Affairs.

22. N. Wright, *Report on the Development of Cattle and Dairy Industries of India*, pp. 11-12.

To find a parallel to conditions in this country, we have to turn to countries like China where the pressure of population on the soil is equally great. 'The Chinese farmer is a cultivator and not a dairyman or grazier', says Pelzer, '....Cattle supply the farmer with draft animals, but not with milk or other dairy products.'²³

This extreme dependence on arable farming is a source of loss to our agriculture in two ways. In the first place, live-stock products like milk, eggs, etc. fetch higher prices than cereals. Hence the dairy farmer is, in general, more prosperous than the cultivator who grows cereals only or mainly.²⁴ Secondly, mixed farming maintains and enhances the fertility of farm land. Not only does the farmer get an adequate supply of cattle dung and urine, but he grows root crops in proper combination with other products and those crops enrich the soil.

Again, within arable farming itself there is in this country a powerful tendency for high yielding crops like rice and inferior crops like jowar and bajri to

23. Karl J. Pelzer, *Economic Survey of the Pacific Area*, Part I, p. 102.

24. The following extract from Yates and Warriner puts the contrast in a vivid manner:

'Let us set down, side by side, the output of two typical farms: a farm of twenty acres in Holland and one of ten acres in Rumania—

Net value of output
(including produce consumed by farm household)

	<i>Holland</i>		<i>Rumania</i>
Milk	.. £ 160	Wheat	.. £ 15
Calves	.. „ 40	Maize	.. „ 15
Pigs	.. „ 35	Pig	.. „ 5
Miscellaneous	.. „ 25	Miscellaneous	.. „ 5
	£ 260		£ 40

Both farms have to support two active workers and three dependant children. The Dutch farm achieves its higher output by having seven cows and seven or eight pigs whereas the Rumanian has no cow and only one pig' (*Food and Farming in Post War Europe*, p. 57).

expand relatively to others. The preference for rice is easily explained. It is one of the crops which can be grown with the least expenditure of capital or human labour, and the chance of getting bumper yields is definitely good. Similarly, interior crops are hardier, and require little or no capital to grow. Illustrations of this phenomenon are scattered all over the country. For example, we read : 'In the upper Ganges Valley, East, population pressure has been followed by an increase in the area under the cheaper varieties of *rabi* grains, e.g., peas and grains.'²⁵ Again, until recently population pressure has been one of the important factors behind the decrease of the area under sugar-cane.

This crop remains on the land for the greater part of the year, and is not reaped till spring. Moreover, it requires that the land should be kept fallow for long periods....Hence the cultivator preferred to grow maize or rice instead of sugar-cane, and then to sow a *rabi* crop on the same field, thus obviating the necessity of long fallowing. In this way he made a more intense use of his land which was necessary in view of the increasing pressure of the population upon the soil.²⁶

In the coastal plains of South India the farmer usually prefers to grow sugar-cane as a rotation crop on rice land or garden land. 'The reasons why a valuable commercial crop like sugar-cane is not favoured are that manure is scarce and dear and that unless the farmer has much good land he will not allow an exhausting crop like sugar-cane to occupy his small holding for a period of nine to twelve months'.²⁷ This tendency is checked only when the effective supply of land per head is increased by irrigation or the opening up of new areas. For example, 'in the canal colonies of the Punjab irrigation has promoted the evolution of a distinct type of farming which differs from the usual variety of subsistence agriculture to be found in the monsoon

25. B. N. Gangulee, Paper read at the First Indian Population Conference. Report of the Conference, p. 97.

26. B. N. Gangulee, op. cit., p. 97.

27. B. N. Gangulee, op. cit., p. 97.

plains. Valuable crops like cotton, oil seeds, and gram have taken the place of cheap millets and pulses, while the cultivation of wheat has increased on a scale which could hardly be imagined before'.²⁸ Thus the ratio between population and area under cultivation determines the type of farming that the Indian farmer follows and the amount of income he derives from his calling.

Lastly, the character of Indian agriculture is determined by the nature of the market for its products. In order to reap as large a return as possible, a farmer in any place tries to adjust his scheme of production to the structure of demand for his produce. The structure of demand for agricultural goods obviously varies greatly from one part to another of this vast country. But it contains two basic features to which Indian farming is oriented everywhere. In the first place, Indian agriculture has to meet an insistent demand for food from a vast population. Secondly, it has to supply a variety of raw materials for industrial processes at home and abroad. The former demand is governed chiefly by conditions internal to the country, of which the size of our population and the level of its income are most important. We have, for some years past, ceased to export food on an appreciable scale: indeed we occasionally supplement our domestic production by imports from abroad. We are thus almost self-sufficient in respect of our food supply, and Indian agriculture carries wholly the responsibility of feeding our large population. But though the number of mouths to be fed in this country is large, income per person is low and poor people can spend only small sums even on the purchase of the food that is necessary to life. It is this fact which defines the opportunity open to the Indian farmer and to which he has in the course of centuries adjusted his farming. He concentrates his limited resources on producing the cheapest varieties of food, those which

28. B. N. Ganguly, op. cit., p. 98.

require the minimum of land and other resources per unit of output. We have seen that cereals are in this respect much more economical than fruits, vegetables, or animal foods, and among cereals, inferior varieties cost less than superior ones. Hence the preponderance of cereals in Indian agriculture and the increasing importance of inferior kinds of cereals.²⁹ The Indian farmer grows these products in relative abundance because the average Indian consumer is poor, and can afford to buy only cheap food. Some facts given below illustrate this point.³⁰

Areas under different groups of crops in India
in 1937-38

	Million acres
1. Major food grains	.. 154·9
2. Fruits, Vegetables and Root crops	.. 4·6
3. Fodder	.. 12·8

The demand for non-food products, on the other-hand, depends on factors which are not immediately connected with the pressure of population at home. A part of it issues from foreign sources and follows closely the movement of world industrial activity, while another part originating at home is governed by the expansion of domestic industries mainly behind the shelter of protection. Both these demands have developed greatly in spite of the slow rise of income per head in the country as a whole. They have thus introduced a factor of expansion into our agricultural economy which would otherwise degenerate into mere sub-

29. Between 1910 and 1939, the production of barley and jowar in India increased by more than 50 and 100% respectively, while that of rice rose by less than 5% and of wheat fell by nearly 3%.

30. This state of affairs is not, however, peculiar to India. It is found in all countries in which high population pressure on land exists with low income per head. In China, for example, cereals occupy nearly 70% of the total crop area, while tubers and roots, fruits and vegetables take up only 5·3%. The character of farming in a country is shaped as much by the income of its average consumer as by the economic resources of its average farmer.

sistence farming. But Indian farming has not gained as much from this opportunity as it could have done. In the first place, its products produced at high cost in terms of human effort have to compete on the world market with those of other countries in many of which the worker is aided by large equipment and developed technique. Secondly, world agriculture was depressed for nearly twenty years prior to World War II and prices of agricultural goods remained below their old parity with manufactured articles. During these same years farming abroad, in the new world in particular, achieved immense progress, not only raising output per worker to greater heights, but also adding to the glut of agricultural commodities on the world market. Indian farming suffered from this glut along with farming elsewhere, but it enjoyed none of the benefits which technical progress conferred on foreign farming.

VIII

The different factors discussed above exercise a disastrous influence on the nutrition and the health of our people. We have as yet no comprehensive survey of this very important problem. But a number of sample surveys in different parts of the country enable us to construct a picture which is correct in broad outline. In the first place, there is an absolute shortage of food in India, a deficiency of calories necessary to mere existence. According to Dr. Aykroyd,

'A reasonable estimate of the number of calories required by a man engaged in easy-going agricultural or manual work is 2,500—2,600. In 1937 the Nutrition Research Laboratories investigated a cross-section of a village in South India when conditions in the District were normal. In 50% of families, calorie intake per consumption unit was below 2,300. Very similar observations have been made among other village groups elsewhere in India'.³¹

31. *Nutrition*, Oxford Pamphlet on Indian Affairs, p. 15.

His general conclusion with reference to the whole country is that 30% of the total population is underfed in normal times. Similarly, Sir John Megaw found from an extensive survey of rural life in India in 1934 that 20% of the population was badly nourished and another 41% poorly nourished, while only 39% got sufficient food. Allowing for the margin of error in these estimates we can conclude that a high percentage of the Indian population does not get enough to eat. We do not produce sufficient food of even the simplest variety to which our people have been driven by poverty and high man-land ratio.

But a man must not only eat enough ; his diet must contain in right proportions the various elements that are necessary to health and physical efficiency. Proper diet is only less important than sufficient food. But the average Indian diet is seriously defective in composition. We cannot, it is true, generalize about Indian diets ; the people of the North and the North-West, for example, have a distinctly better diet than those of the East, South and South-West. But taking the country as a whole, there is a preponderance of cereals, an insufficiency of proteins especially of the superior type supplied by animal food, milk, meat and eggs, a serious defect of fats, and a complete inadequacy of constituents like fruits, vegetables, eggs, milk, etc. that contribute the requisite quotas of various vitamins. For the poor quality of our national diet, our food habits, shaped by religion and social values are, in part, responsible ; the aversion of the Hindu to meat, in particular to beef, and of the Muslim to pork limits the sources from which animal protein may be obtained. But, again, the main explanation of our poor diet is furnished by factors in our economic life. In the first place, the primary end which food is intended to satisfy is the supply of energy represented in calories, sufficient for the purpose of life and work, and only when this fundamental need has been met, that the consumer looks for other values in his diet. Hence where

the consumer's resources are inadequate, he will naturally prefer food which is merely energy-yielding to others that possess other values in addition. Now, in general, cereals and pulses contain per unit of weight higher calorie values than vegetables, fruits, meat, fish, eggs and milk. Moreover, the former can be produced with less cost than the latter, so that a given quantity of calorie can be obtained more cheaply through a diet of cereals than through another in which protective foods form an important part.³² We now understand why the South Indian peasant secures 90% of his calorie from cereals and why the consumption of milk per head in this country is only 7 oz., while the average individual in the U.K. drinks 39 oz. and in Sweden and Finland more than 60 oz. The average Indian farmer goes in for the production of inferior food, cereals and inferior crops, in part because the average Indian consumer lacks income to buy a properly balanced diet. Our poverty determines the content of our national diet, and this in its turn helps to mould the character of our farming. In this country as elsewhere nutrition and farming are closely inter-dependent and both are, in ultimate analysis, shaped by economic forces.

This conclusion receives support from the fact that as we proceed from lower to higher income classes in this country, the diet of the average representative improves greatly in composition. 'There is no doubt' says Dr. Wright, 'that the Indian appreciates the value of milk

32. According to Aykroyd (*op. cit.*, p. 18), the cost of a well-balanced diet which provides calories, protein, vitamins and other food constituents in satisfactory amounts was in pre-war days 'between Rs. 4 and Rs. 6 per adult per month, or between Rs. 16 and Rs. 24 for a family containing the equivalent of four adult males. The cost of an ill-balanced diet, sufficient in quantity but defective in quality, was about Rs. 10 monthly for a family of the same size. Comparison of these figures with actual pre-war income levels in India indicates the gulf between possible and desirable expenditure on food on the part of a large section of the population.'

and that if he has sufficient means he will increase his consumption of this food'.³³ For example, a sample survey of Bombay family budgets shows a ten to fifteen fold increase of milk consumption between the lowest and the highest income groups. Similarly, Dr. Aykroyd states that 'there is normally a rise in the consumption of non-cereal foods, e.g., milk, vegetables and fruit with increasing income and a corresponding decrease in the percentage of total calories obtained from cereals' and concludes 'that an increase in the material prosperity of the country—a rise in the national *per capita* income—will *per se* tend to improve standards of nutrition and with these the health of the population'.³⁴

33. Wright, op. cit., p. 6.

34. Aykroyd, op. cit., pp. 18.-19. It would, however, be wrong to infer from these statements that there is no scope for improving the diet of the relatively well-to-do classes in India. Far from it; we are still too much inhibited by religious prejudices in the choice of our food.

PART III

THE FUTURE OF INDIAN POPULATION AND INDIA'S FUTURE

I

The general impression that the preceding sections of our study have left in the mind is depressing ; a vast population breeds and dies lavishly, and lives and expands at a low level of economic achievement. A high birth rate is matched by a high death rate, and a big proportion of those who are born die young so that mean after-life time at birth is less than half the corresponding Western European figure. Income per head is extremely low. Important sections of the economy are seriously congested, and output per worker is small even in occupations which are ahead of others in efficiency.

Instinctively we turn from this melancholy picture to the unborn future and ask ourselves if it will turn out better than the past. The answer to this question will depend upon a variety of things that we may do and that may happen to us. It should, however, be evident by now that one of the factors that will determine the nature of the answer will be the behaviour of our future population. Will it grow more or less fast than it did in the past or at the same rate ?

It is usual in seeking answer to questions of this type to make use of the past as a guide to the future, to project into the future trends that existed in the past. Unfortunately, such a simple procedure is not available in respect of the population of this country. During the 70 years for which we have a reliable history of our population, its rate of growth varied widely from decade to decade. Periods of rapid expansion alternated with those of slow change, baffling the efforts of the demographer in quest of a normal rate of change. These facts are shown in the following table :—

Intercensal change of Population in India 1872-1943

	Rate %
1872-81	.. 1·5
1881-91	.. 9·6
1891-01	.. 1·4
1901-11	.. 6·4
1911-21	.. 1·2
1921-31	.. 10·6
1931-41	.. 14·7

Evidently we cannot manufacture out of the above table a rate of change that can be sensibly projected into the future. Our population has not yet attained a stable pattern of growth that we can expect to last into the future.¹

II

The simple method of extrapolation having failed us, we have to judge the probable behaviour of our birth and death rates and derive therefrom the rate of change of our number.

During the period covered by the preceding table, our recorded birth rate remained more or less steady at its present high level. On the other hand, the death rate fluctuated widely ; and there were several years in which it surpassed the birth rate, though towards the end it showed a distinct tendency to move away from the latter. Thus the wide fluctuations in the rate of our growth in the past were due mainly to the vagaries of our death rate, and it is nearly safe to assume that for some time to come, it is the behaviour of the death rate which will chiefly govern our rate of change.

Our oscillating death rate is an index of the fitful and inadequate control over environment that we have achieved. During the period covered by the preceding table our national output increased greatly, but

1. This is largely the result of famines and epidemics.

population too grew commensurately, and though general conditions of life improved in many respects, large numbers still lived on the borderland of existence between life and death, so that alternations of good and bad years, years of good and bad crop, or of normal health and epidemic sent our death rate up and down the scale. This was our past and evidently the future will depend on how extensively and how continuously we control the movement of the death rate.

Probably the most important single factor behind our high death rate is malnutrition which is a natural product of poverty. Malnutrition raises our death rate in two ways. In the first place, nutritional diseases are omnipresent in this country ; a large fraction of the population suffers from malnutrition and deficiency dis-

2. The causes of death in this country are extremely imperfectly recorded. In 1939 the general death rate of 22·2 was distributed as follows :—

Cholera	Small-pox	Fevers	Dysentery and Diarrhoea	Respiratory diseases	Injuries	All other causes
<hr/>						
Deaths per 1000 of population.	.4	0·2	0·1	13·0	0·9	1·8
% of total	1·8	0·9	58·1	0·5	4·1	26·1

About 60% of all deaths were due to 'fever' and another 25% to 'all other causes.' 'Fever' is an omnibus term which probably includes a wide variety of ailments of which fever is merely a symptom. Under it comes Malaria and Tuberculosis, which probably account for nearly a fourth of total deaths from fever. Similarly, the miscellaneous category 'all other causes' is annoyingly vague and undefined. We need not, however, feel thwarted by the fact that 85% of our total deaths are not properly classified. Behind diseases which are the proximate causes of death are factors that are responsible for both disease and death, and we have a fairly reliable knowledge of these basic factors.

eases of every kind flourish rankly among it. Secondly, malnutrition lowers the resistance to infection of our people and makes them easy victims of other diseases—Malaria, Kala-azar, Cholera, Dysentery, Tuberculosis, etc.

The next important cause of our high death rate is dirt which includes insanitary ways of living as well as immediate agents of infection. Dirt is a product of private ignorance and public inefficiency. We live in over-crowded places, we eat, drink and inhale infection in every conceivable way, and though we may have developed a certain degree of immunity we contract and succumb to infectious diseases in large numbers. Epidemics visit our country with a regularity that would strike any western people with terror, and a number of them have almost usurped the role of endemics. We invite infection and disease by our method of living, private and public, while poverty and malnutrition seriously undermine our powers of resistance. Add to these general causes, special factors like early and frequent child-bearing and the absence of ante and post-natal care, and we have an explanation of our high infant and maternal mortality rates.³

3. The chief medical causes of infant mortality in this country are infantile debility and malformation including premature birth, diseases of the respiratory system, convulsions, and diarrhoea and enterics. Premature births are probably closely associated with premature maternity, while pneumonia is casually connected with malnutrition and over-crowding, which are normal indices of poverty.

According to the enquiry carried out by Dr. Neal Edwards in Calcutta in 1936-37, the most important causes of maternal mortality were puerperal sepsis, anaemia, albuminaria, convulsions and haemorrhage. Behind these immediate causes were, however, three ultimate factors: poverty, malnutrition and insanitary living; early and frequent child-bearing; and inadequate ante-and post-natal care. It is difficult on the basis of our present knowledge to assess the relative importance of these factors. But the general impression conveyed by Dr. Neal Edwards' study is that malnutrition, insanitary conditions of life and lack of care during child birth are the basic causes, though early and frequent child-bearing contributes significantly to the final result.

The majority of deaths in this country thus result from causes which originate in our environment, so that our death rate will fall immediately we control and improve that environment. In the first place, any increase of income per head in this country will bring about a decline of mortality. Our people are starved and badly fed, and die in hundreds of thousands from mal-nutrition. A higher income will enable them to improve their diet and resist disease and death less ineffectively than at present. Secondly, almost all important diseases which, as epidemics or endemics, cause havoc among our population, can be controlled and even eradicated by means which are not beyond our reach. To take a few instances. There is no serious disease, according to Sir John Megaw, formerly Director-General of Medical Services in India, which is easier to eradicate than cholera provided an intelligent effort is made by the community. Again, several countries have completely eliminated small-pox by compulsory vaccination. Similarly, the incidence of tuberculosis and diseases of the respiratory organs can be greatly reduced by proper nutrition and proper habits of personal hygiene. Thirdly, even if income per head does not rise, but the aggregate income of the community increases, large sums are likely to be spent in future on ameliorating general conditions of health and existence. Sound health and long life are ends in themselves, and once we become sufficiently conscious of their importance, we shall employ a good part of our national income to attain them. We should, finally, add to the effect of measures for health, the influence of increasing education and the appreciation by our people of the need to adjust our mode of life to the requirements of health and efficiency.

All this expenditure is likely to lower our death rate appreciably, for the scope of improving public health is extremely wide in this country. In the first place, our health policy is still, in the main, a disease policy ; it

is concerned with controlling and fighting diseases, in particular epidemics, rather than creating conditions of life in which disease becomes a rare phenomenon. Social insurance has been introduced only in the case of workmen's compensation and benefit, though health insurance is now under active consideration. Housing conditions are deplorable in cities and villages, and in most places sanitary rules and regulations are inadequately enforced. Secondly, even within the limited field of disease control, the aggregate of medical and nursing facilities that are available to our people, is extremely insufficient. 'There are altogether 6,500 curative dispensaries and hospitals in India which can treat annually only a total of 35 million new and old patients. The bulk of medical relief for India's 400 millions, of whom more than 80% live in villages, is still provided through the indigenous pre-scientific systems of medicine and their practitioners'.⁴

It is, therefore, likely that our death rate will fall in future, and it is also probable that the decline will be significant.⁵ This is the conclusion which is reasonably indicated by the opinion of experts, and the achievement of other countries. Says Sir John Megaw :

There are certain critics who argue that the triumphs of disease prevention cannot be repeated in a tropical country like India. Let the facts speak for themselves. In 1852 the death rate among British troops in India was 69 per mille; by 1875 it had fallen to 20, by 1900 to 13 and at the present time it is said to be 2½ per mille. The death rate among Indian soldiers has fallen from 11 per mille in 1900 to just over

4. J. B. Grant, *The Health of India*, Oxford Pamphlets on Indian Affairs, p. 16.

5. There are already signs of this improvement. Between 1920 and 1940 the officially recorded death rate fell from 31 to 22 per thousand. Vital statistics in India are extremely imperfect and the downward trend in the death rate may not be yet statistically significant. Nevertheless in view of the development of these statistics towards fullness and accuracy, it is justifiable to conclude that such a trend exists. (*Census of India, 1941*, vol. I, p. 33).

2 per mille in 1935. Among prisoners there has been a corresponding improvement. From the appalling figure of 100 per mille in 1859, the death rate has fallen to about 10, a figure which would have been regarded as remarkable even so recently as 1900, when the mortality rate was 35 per mille.⁶

What was achieved among a select population living under controlled conditions cannot probably be repeated in the same measure in a vast population of ignorant, underfed, and ill-housed men and women. But a great deal can be done even among them. 'If the people of India', says Megaw, 'were properly nourished, if they avoided living in the same room with persons who sneeze and cough, and if they took precautions to avoid swallowing infection with their food and drink, their average duration of life would be doubled'.⁷

A sufficient and proper diet, better housing and better public and private hygiene may possibly cut down our death rate by half and enhance our rate of growth correspondingly. And this is not just fantasy. The Indonesians increased at an average yearly rate of 1·79% between 1920 and 1930 which was twice the speed with which we expanded in the same decade. This was mainly the result of sanitary and economic measures. 'The rapid expansion of the population of Java and Madura is a result of the Dutch administration, which put an end to wars, applied modern Western hygienic measures (such as vaccination against small-pox) and developed the economic potentialities of the island'.⁸ The same story is told more vividly in the following table⁹:

6. *Social Service in India*, p. 187.

7. *Social Service in India*, p. 229.

8. Pelzer, op. cit., p. 58.

9. Grant, op. cit., p. 17.

Mortality from Small-pox and Cholera per 1,00,000 population
in some Asiatic countries in 1937

	British India	Burma	Japan	Philippines	French Indo-China	N. E. Indies	Thailand
Small-pox	.. 16·2	7·3	0·008	0·0	3·0	0·0	0·08
Cholera	.. 29·3	23·7	0·01	0·01	38·3	—	41·1

The differences between death rates in India and elsewhere, in particular, in Japan, the Philippines and N. E. Indies are to-day remarkable. Yet at the turn of the century the rates were practically the same in all Asiatic countries. Only while other countries have marched forward rapidly, we have moved at a leisurely pace. But there is nothing to keep us from emulating others, and if we can control the causes of death and disease as effectively as, for example, the Japanese and the Filipinos, we shall raise our survival rate to double its present height. An annual rate of increase of 20 per thousand of the population is not at all improbable in India in the light of the progress that other Asiatic countries have made.

As mortality conditions improve in this country, certain groups will reap more than the average benefit ; it is likely that deaths among infants, children and boys and girls will fall more than among older persons and that women will gain more than men. In the first place, those are the groups which show, in comparison with the English population, disproportionately high rates, and offer in consequence the greatest scope for improvement. Secondly, it is in respect of those groups that Western peoples have achieved the greatest advance in the conquest of mortality. Finally, in all communities they receive the first attention of awakening social

conscience, and the first surplus that rising national income brings into existence is spent on them. We should, on all these grounds, expect our infant, child and maternal mortality rates to fall more steeply than our general death rate. But a fall of death rate among these groups will have a double effect: it will add to the current survival rate, and raise future birth and survival rates.

III

The improvement of our mortality conditions is likely to be followed by a rise of the birth rate. In the first place, women will gain more than men and the deficiency in the sex ratio of the population will be reduced. Secondly, maternal mortality will fall more than the death rate of women in general enhancing thereby the proportion of child-bearing women. Thirdly, the benefits of improved circumstances surrounding motherhood are likely to accrue most to women in the early and more fertile phase of their career¹⁰ which will cause a more than proportionate improvement in total fertility. Fourthly, as the relative numbers of men and women in the middle ages become less unequal, the difference in age at marriage of husband and wife will shorten and the incidence of widowhood among women will decrease. Finally, the death rate will fall precipitously in the early years of life, in infancy, childhood and adolescence. This will, in a few years, inflate the proportion of persons in the child-bearing ages and add

10. Premature child-bearing is supposed to cause havoc not only among young mothers, but also among women in ages 20 to 30. Maternal mortality is highest in the early ages, but a proportion of mothers who survive the experience of early and frequent motherhood succumb to death between the ages 20 and 30 from various diseases and ailments which are the aftermath of premature child-bearing.

to the total number of births in the community in the first and succeeding generations.¹¹

The effect of falling mortality on our birth rate will be reinforced and modified by other factors. On the one hand, there is likely to be a decline of the existing high proportion of widows of child-bearing age and increase the birth rate. On the other, the proportion of unmarried women in the population will rise somewhat partly through an increase in the number of confirmed spinsters, but mainly through a general rise of the age at marriage of our girls. There has been some rise of this age in recent years in consequence of legislation, and some further increase will result from a better enforcement of laws and spread of education and enlightenment among the people. This may conceivably lower our birth rate. Nearly 45% of our girls now marry by age 20, and ages 15 to 19 happen to be the period of highest fertility of our married women. Hence a shift in the average age at marriage of these early marrying women from 15-16 to beyond 20 will reduce the birth rate for two reasons. First, of the 45% who postpone marriage to beyond 20, 6% die even before they marry,¹² and secondly, those who survive and do marry will start child-bearing only after the most fertile phase is past.

This conclusion will, however, hold only if specific fertility rates at higher ages remain unchanged.

11. For example, it estimated that with an infant mortality of 160 in 1940 as compared with 195 in 1920, we shall have an addition of 6.5 million persons to our population in 1951 and 11.1 millions in 1961. Similarly, a fall of our maternal mortality rate from 20 to 10 per thousand live births will add over 6 million females to our population, which has again to be multiplied by their reproductive potential to give us an idea of the total accretion. (*Census of India 1941*, vol. I, p. 34 and also pp. 41-50).

12. We should not, however, expect any great change in this factor in the near future. The percentage of widows in ages 15 to 40 in 1931 was the same as it had been in 1891; ancient custom proved stronger than the wishes of the reformer.

But the pattern of fertility will probably alter when the age at marriage of our girls rises. According to the census report of Baroda, a State in western India, 'if the age at marriage (of girls) is changed from 13 or 14 to 20, the rate of fertility is....raised'¹³ by 10 per 100 mothers. This is probably the outcome of two factors. First, when the age at marriage rises by, say, 5 years, the length of the reproductive period does not necessarily decrease by the same number of years. For Indian women in general, we have assumed this period to commence at 15 and terminate at 45. But few of them bear their first children at 15 and their last at 44; those who commence child-bearing prematurely also end it early. Thus a rise of the age at marriage of Indian girls by, say, 5 years may shorten their reproductive period by only 3 years. Secondly, a shift in the age at marriage from early years will improve the health of our women and this will exercise a favourable influence on their fecundity.¹⁴ Hence the average Indian girl who postpones her marriage to beyond age 20 may contribute, not less, but more, to the expansion of our population than if she married at 13 or 14. However, it is likely that these two factors, viz., the rise of the age at marriage and change in the pattern of fertility taken together, will cause a slight fall of our birth rate. But this will be more than outweighed by the positive influence of improved mortality conditions on fertility so that the final result¹⁵ is likely to be some

13. *Census of India, 1931, Vol. XIX, p. 178.*

14. 'An increase of the reproductive period through an improvement in living conditions, especially through a more regular and more rational food consumption is conceivable in two ways. It is possible that the child-bearing period be expanded or that the child-bearing capacity be intensified'—R. Kuczynski, *Population Movements*, p. 35.

15. According to Baroda Report, the average number of children born per mother rises from 5·7 to 5·8, when the age at marriage increases from 13 or 14 to 20, while the number surviving changes from 3·5 to 3·6. The former represents an increase of less than 2% and the latter of less than 3%, while according to the 1931 All-India Life Table 6% of women in ages 15 and 16 die before they reach age 23.

rise of the birth rate. There seems to be at least small chance of its falling, and this put alongside a fall in mortality will give us a large increase of our survival rate.

IV

Thus the population of this country left to itself will grow faster than it has done up to now and general considerations suggest that the change in the rate of growth may be pretty large. This phase of expansion through reduced death rate may, however, be succeeded by another in which the birth rate begins to decline to the level of the death rate and the population problem assumes a new form. This is what has happened in Europe and is happening in Japan. It may happen to us too. But we start from a different base; we are already pretty large in relation to our resources and the prospects of our being allowed to spill over to other parts of the globe are nil. Hence for us the length of the interval between the two phases is highly important. We should decide whether we can leave it to be determined solely by the development of social forces or deliberately organize our efforts to shorten it as much as possible.¹⁶

Our decision will evidently turn upon the contribution that the further growth of population can make to the expansion of our economy. In the short period, the growth of population may increase employment and

16. The phase has sometimes been pretty long. 'For example in England and Wales the annual number of deaths per 1000 of the total population fell from the neighbourhood of 30 to 35 in 1740 to 27 in 1800, to 22 in 1860, and to about 12 or 13 in the 1920s'. The birth rate on the other hand, responded more slowly. 'In England and Wales, according to the best information available, the annual number of births per 1000 total population remained fairly steady in the neighbourhood of 35 to 37 during the whole century from 1740 to 1840. Then it fell slightly and remained around 35 until 1880. Thereafter it dropped rapidly, reaching 30 in 1900, 25 in 1920 and 15 in the 1930s'. (E. Staley, *World Economic Development*, p. 210).

output by stimulating consumption and investment at the expense of hoarding.¹⁷ We have in our country innumerable hoards of barren money and extensive unemployment in agriculture and cottage industry. But our hoards are held for reasons which cannot be modified by the growth of population, while our unemployment is of a kind which can only be aggravated by it. In the first place, a good deal of hoarding in this country arises from lack of investment facilities—the absence of easily marketable assets and of institutions that can handle them. Secondly, the cost of small-scale investment is everywhere disproportionately high, so that the aggregate liquidity hoard tends to be large in a country of small income-earners. Finally, the richer peasants and traders and moneylenders hoard a certain amount of cash to take advantage of changes in the value of land and the seasonal price of corn. Unquestionably these hoards must be unfrozen and made available for productive use. But to achieve this end we require the evolution of suitable institutions and not further additions to our number.

We have, again, wide-spread unemployment of labour. But lack of work in this country is distinct from the malady which afflicts advanced economies. We do not have unused productive equipment co-existing with jobless labour; we suffer, on the contrary, from a surfeit of labour supply relatively to our resources in land and capital. Our unemployment is thus largely

17. Given the productive equipment of a society, its actual aggregate income depends upon the volume of aggregate effective demand, i.e., the aggregate amount of purchasing power that people spend on consumption and investment. It has, however, been found that a community, once it reaches a level of prosperity, spends less than its total income, the proportion of unspent margin rising with the height of income. If, however, the society is growing in numbers, this tendency to hoard would be checked. The increasing population will have to be fed, clothed, housed, etc., and this will increase consumption and investment which will in its turn create further income and further demand for consumption and investment.

under-employment, originating in a disproportion between different factors of production rather than in a shortage of aggregate effective demand. Obviously, the growth of population can do nothing to correct it in the short period; it may, on the contrary, aggravate it in the long run. For once full employment is reached—and poor and undeveloped countries have invariably 'full employment'—the problem is no longer one of obtaining a larger income from a fuller employment of present numbers in conjunction with current equipment. It is that of expanding the equipment and redistributing the labour power sufficiently quickly to ensure a rising income per head. But income per head can rise only through the adoption of a higher technique of production and transfer of labour power from low-income to high-income occupations.¹⁸ Will a rapid growth of our population help us to attain these immediate objectives?

We can, of course, apply our present technique more effectively than we are actually doing; the Chinese farmer and the Japanese cottage worker obtain better results from methods and instruments more or less similar to ours. We can also improve our technique within the limits of the stage of development it represents; we can have better ploughs, superior charkhas and improved looms. And essays in these directions will add something to the income of our people. But the gain, though welcome, will not amount to much; it will not be, in any event, sufficient to cope with the needs of a rapidly rising population. This is what we read about China : 'In spite of the most intensive use of human labour, Chinese agriculture does not produce such high yields as are frequently claimed. China's yields are better than those of India and Russia, not as

18. The two processes of rising incomes and changing production organization should not, however, be regarded as independent of each other. 'We do not increase income first and adapt our methods of production afterwards.....At the same time, as we improve our production, the average level of income also rises' (*Capital Investment in Africa* by S. A. Frankel, p. 5),

high as those of Japan, and with the exception of rice, are less favourable than in other countries such as Italy, Germany, Great Britain, and the United States'.¹⁹ And the strength of the small-scale industry in Japan is founded as much on the skill of the worker and the organizing ability of the entrepreneur as on the sweating and low standard of living of the former. The moral of these examples is that we must adopt a higher production technique in order to raise the income and living standard of our people. But since higher technique normally implies using more land and/or capital relatively to labour,²⁰ the central issue for us is whether a rapid expansion of man-power will enable us to increase the supplies of these other agents of production even more rapidly.

The disproportion between labour and other factors of production is greatest in our agriculture. The average farmer has not enough land to occupy him and his family fully, and he is obliged by his poverty and the tiny size of his farm to use the simplest implements and the smallest quantity of capital. To enhance the output of his farm, therefore, it must be reconstructed on a larger scale and provided with sufficient capital. But obviously, a growing population will not help us in this effort. Ours is not a newly settled country in which new areas await occupation by settlers and old areas need a growing population fully to utilize them. We have, it is true, large tracts classified as culturable waste, and some people look to them as the home of future generations. But curiously enough over a period of 30 years and more, during which density of population increased steadily and the price of land ruled high, the

19. Pelzer, op. cit., p. 109.

20. Higher technique also calls for greater skill and intelligence on the part of labour. But 'skilling' of labour may be conveniently regarded for our purpose as a problem of capital investment, of investment in human capital.

size of our culturable waste did not shrink noticeably. This could not have been due to lack of enterprise on the part of our farming community. For home-loving and slow-moving though our people are, they do respond to the lure of profit and the pressure of need and migrate to new areas in search of higher incomes and spacious homes. The canal colonies of the Punjab were peopled in less than a generation, and hoards of squatters swarm every year from the congested district of Mymensing in Bengal into the vacant spaces of Assam. The truth of the matter is that a good part of the so-called culturable waste in our country is not culturable at all with the technique and resources of the Indian farmer. What Yashonov, a Russian writer on Chinese agriculture, says of China applies equally to our country. 'If', says he, 'with the acute shortage of land and its high prices, the Chinese peasant was not able to increase the sown area, it is evidently the result of insurmountable obstacles.'²¹ Apparently, the Chinese peasant lacks the technical, organizational and material premises which are required to put land, now uncultivated, under the plough. And so does the Indian peasant.²² But the growth of population will not remove these deficiencies and provide him with resources to open up our cultivable waste. We shall not, therefore, expect an improvement of the man-land ratio in our agriculture as a result of the growth of population. On the contrary, every increase of number, unless it is taken off the land, will reduce the area per cultivator

21. Quoted by Pelzer, op. cit., p. 108.

22. Sir G. Clarke, President of the section of Agriculture at the 17th Indian Science Congress, 1939 said :

'For a number of reasons, the area of cultivable waste gives an unreal conception of our resources. Much of the land thus classified includes areas physically capable of being employed for crops only when our need is so extreme that considerations of cost of utilization are relatively secondary.' But the pressure of population must be great indeed and the struggle for mere existence extremely intense, before questions of cost become of secondary importance.

and greatly multiply the diseconomies from which Indian farming suffers at present.

Can we not, however, offset the effect of a rising man-land ratio by increasing the quantity of capital per worker and per unit of land ? There are three ways in which this can be done.²³ In the first place, while retaining intact the technique and character of our farming, we can invest capital in improved seed, better and adequate manure, a greater and more efficiently managed supply of water, and in wide-spread control of pests and diseases that damage our crops. Opinions

23. In order to appreciate the technological possibilities of development, we are here assuming away all problems of capital supply in Indian agriculture. A few essential points should, however, be noted. First, the necessary capital must come from outside ; it cannot be provided by Indian farming itself. The individual farmer's income is small, and probably the aggregate surplus income originating in the countryside is inadequate to the needs of farming and other rural enterprises. All the money in the hands of professional money-lenders is always out on loan and can only be obtained on competitive terms. New sources must, therefore, be tapped which means in Indian conditions either a system of State Banks or a system of Co-operative Credit amongst the cultivators. But, secondly, not much reliance can be put in the Co-operative movement, which, after forty years' experiment, still touches only the fringe of the problem. This state of things is due to factors more fundamental than administrative inefficiency. 'It is a well-known social phenomenon that beyond a certain level of social degradation and misery there is no longer a response in the form of an energetic struggle against the unfavourable conditions, but, on the contrary, an apparent loss of this capacity of reaction, and the sinking into a state in which all hope is abandoned and social conditions are dragged down in a vicious spiral to the lowest depths.' (*Population and Agriculture, with special reference to Agricultural Over-population*—League of Nations, pp. 56-57). This is the condition to which our people have been brought by poverty, malnutrition and disease. How else can one explain the utterly submissive way in which hundreds and thousands died during the recent famine in Bengal ? Hence, finally capital must be provided by the State. But will the return on capital invested in agriculture be large enough to cover the cost of its supply ? This is not an entirely irrelevant or impertinent question to ask, even though investment in agriculture need not necessarily be determined by financial considerations alone.

differ as to how much we can achieve by these expedients. It seems, however, from an authoritative study of the subject²⁴ that we can enhance our output of important cereals and oilseeds by some 20 to 30% by using better seeds, and more manure and by protecting crops from pests and diseases. Probably an equal increase can be obtained from the extension of irrigation. The production of irrigated crops per acre is said to be on an average 50 to 100% higher than that of unirrigated crops in the same locality and only a fifth of our total cultivated land is now irrigated. There seems to be, therefore, a large scope for increase of agricultural yield through expansion of irrigation facilities. It is, however, necessary to note first, that 'the day of great irrigation schemes in India is over'.²⁵ Outside the areas covered by the main irrigation works 'all available river supplies have been fully utilized, and if anything is to be done it must be by means of storage works to hold up the water that now runs away during the monsoon period to the sea, or else by pumping from the subsoil water table by means of tube wells'. Secondly, not all crops in the un-irrigated area will benefit from irrigation. Some do as well on dry farming methods, and of the two important food grains, viz., rice and wheat, the latter only stands to benefit greatly from the spread of irrigation, while 'so far as rice is concerned, the effect of such increased water supply would be more to extend the area under it than to increase the acre yields'.²⁶ Thirdly, irrigation cannot be carried beyond the limits which the supply of available manure fixes. On the one hand, the Indian soil is already exhausted and 'an addition of even 10% to the yield would ultimately impose

24. *Technological Possibilities of Agricultural Development in India* by W. Burns, Officer on Special Duty, Department of Education, Health and Lands, Government of India.

25. Sir Bernard Danley—Irrigation and its Possibilities. *Economic Problems of Modern India*, Part I, Ed. by R. Mukherjee, p. 165.

26. Burns, op. cit., p. 55.

a severe strain on (its) frail fertility reserves and would gradually lead to (its) permanent impoverishment'.²⁷ On the other, 'irrigated crops trench on the temporary fertility of the soil, which must be restored either by manure or rest'.²⁸ A good proportion of our cultivated land, however, takes rest every year and we cannot allow the area under current fallow to increase at the expense of our total agricultural output, while the supply of manure available to Indian farming is extremely inadequate. First, the quantity of farmyard manure being governed by the number of animals, we cannot increase the former without adding to the latter and thereby encroaching upon areas now devoted to the growing of food grains for human consumption. Secondly, as only 40% of the farm yard manure is used as manure, another 40% being burnt as fuel and 20% lost through defective methods of collection,²⁹ we can increase the supply of farmyard manure by discovering alternative sources of fuel supply. But to replace cattle dung by wood as fuel, 'each village would need about 60 acres under fuel trees'³⁰—which means a total of 42 million acres for 7 lakh villages in the whole of India. Evidently, we cannot secure this aggregate area, leave alone the difficulties of properly distributing it over the country. We cannot similarly rely upon green manures and oilcakes. In many areas a field which can produce a green manure can also produce a food crop instead, and though oilcakes have an important use as cattle feed, less than a fourth of what is needed for the purpose is available. We may, finally, rely upon composts and chemical manures or fertilizers. Probably there is good scope for the manufacture of

27. Howard, op. cit., p. 39.

28. Voelcker, op. cit., p. 99.

29. *Memorandum on the Development of Agriculture and Animal Husbandry in India* of the Advisory Board of the Imperial Council of Agricultural Research, India, p. 27.

30. *Ibid.*, p. 28.

and use of composts in this country, but artificial manures, it seems, according to one expert at least, can be employed only at a great risk of damage to the permanent fertility of the soil.³¹ When all these limitations are taken into consideration, it would seem, on a rough judgement, that further extension of irrigation facilities cannot add more than another 20% to our agricultural output.

We can, thus, while retaining the technique and resources of the individual farmer intact, employ other agents to increase the output of farming by 40 to 50%. But clearly this is an addition which will be swallowed up by the growth of population in two decades, and we may not be able to repeat our performance from decade to decade. For there are limits to the extent to which capital can be substituted for land, and if the size of our average farm continues to shrink year by year, we cannot be far from the point at which the most efficiently worked unit will be too small for the needs of the farmer and his family. 'The intensive cultivation of the Japanese', says Marrack, 'gives a higher yield per acre, but hardly so big as to support a family and pay interest on debts with the produce of $\frac{1}{4}$ acre'.³² And investigations conducted by the Japanese Department of Agriculture show that the standard of living of tenants who along with part-tenants constituted 79% of all households engaged in agriculture in 1937, borders on destitution.

Secondly, capital may be employed to alter the character of our farming and shift the emphasis from the production of grains to that of live-stock products. This would be an entirely desirable change; for mixed farming not only raises the value of the farm produce and maintains the quality of the soil, but also facilitates rapid accumulation of farm capital. 'A live-stock

31. Howard, op. cit., pp. 37 and 38, on the effect of artificial manures on soil fertility.

32. J. Marrack, *Food and Planning*, p. 273.

farmer tends to put his savings into more live-stock and in this way, provided land be not too scarce, he can proceed from strength to strength, always increasing his productive assets. Under grain-farming the peasant's savings have no outlet except in buying more land ; this does not increase productive assets, it merely raises land prices'.³³ But to accomplish a change-over from grain farming to live-stock husbandry in this country we shall have, first, to increase the size of the average farm and, secondly, to provide profitable markets for the costly products of live-stock farms.

The first change can be effected through the consolidation and amalgamation of farms into units of much larger size. But this will throw off the land a huge surplus of workers for whom jobs must be found in non-agricultural occupations. For the second to be possible we must have a great development of our general economy. It has been found by experience that costly live-stock farming flourishes best where it is aided by nearness to high-income-earning urban populations. The average Indian cow, it is said, could yield much more milk than she actually does, if she were fed and looked after properly. But with the market for milk being what it is, the farmer keeps her on short ration and gets a poor yield at low cost.³⁴

33. P. L. M. Yates, and D. Warriner—*Food and Farming in Post-war Europe*, p. 64.

34. 'Milk is chiefly produced as a by-product of agriculture, the milking stock are largely fed on dry fodder which would be otherwise valueless and the labour costs are negligible. Under such conditions the cultivator can afford to sell his milk at a remarkably low price, 6 pies per lb. being not uncommonly accepted. On the other hand, figures obtained from a study of the costs of production of milk on Military Dairy Farms as well as from other large dairy concerns, give costs of production of from $6\frac{1}{2}$ to 11 pies per lb. while another independent investigation showed a figure of just over 1 anna per lb. The specialized production of milk does not appear, therefore, to be economically feasible unless an exceptionally good market is available.' (Wright, op. cit., pp. 59-60).

The final method of improving the proportion of capital to labour in our agriculture is to mechanize cultivation. But mechanized cultivation pays only on large extensive farms, so that to make it possible in our country we have to reconstruct our farms on enormous scales. A first step in this direction would be to consolidate the individual farmer's holdings. But consolidation alone cannot take us far ; the size of the consolidated unit would still remain too small to offer scope for the use of machines, and holdings of many farmers would have to be amalgamated to provide farms of efficient size. How large mechanically worked farms should be in our country it is difficult to say ; soil, climate, nature of the crops to be grown, and the price of farm labour will decide for each area the dimensions of the optimum unit. But even if the units are not as big as some on which cereal production is carried in the New World and the U.S.S.R., they will be much bigger than our biggest farms. For wherever cereals constitute the sole or almost the sole product, the large farm has a decided advantage over the small one. But the large farm mechanically operated is a labour saving device ; an acre of rice land requires 93 days' labour in China, but only 3 days' work in the U.S.A. Hence any attempt seriously to mechanize our agriculture and raise output per worker will create an enormous problem of unemployment among farm workers which, as we shall shortly find, no attainable rate of industrialization can liquidate.

To sum up. We cannot hope to increase the total supply of land in our country so that with population expanding rapidly, the amount of land per worker and income per head in agriculture will fall quickly. We can, however, try and offset the effect of rising man-land ratio by enhancing the investment of capital in farming. But the extent to which we can do so is circumscribed in several ways. First, the scope for investment will necessarily remain narrow, so long as we stick to the

traditional technique of cultivation. Secondly, we can invest capital in our agriculture to facilitate transition to mixed farming. But the increasing density of our population will seriously hamper our efforts. We shall throw off the land a vast number of workers who can find work in other avenues of employment only at great cost in terms of human misery and suffering. Finally, this problem would be greatly magnified if we attempt to mechanize our farming operations. Indeed, mechanization seems hardly possible in our country in view of the enormous problem of rural unemployment that it will create. Thus the roads to escape from low income in agriculture are either blocked or strewn with huge boulders by the high density of our rural population.

VI

However, most people who are complacent about the future of our population pin their faith on industrialization as a solvent of our difficulties. The basis of this faith will be examined in a moment. It is, however, necessary first to state the argument for industrialization correctly in relation to the population question. The issue is not population *versus* industrialization, as it is often put by many persons. We do not have to choose between increase of number on the one hand and reorganization of our economy on the other. On the contrary, we should industrialize our economy, even if we decide to control births, and we may have to restrict the growth of our population even if we can industrialize our economy. First, the state of our farming and the need for reconstructing it are sufficient arguments for industrial development. We can never hope to be rich with our agriculture using primitive technique and inadequate resources, while any attempt to reorganize it on efficient lines will swell the surplus of farm workers for whom

jobs must be found in the industrial sector of the economy. Again, we cannot successfully develop mixed farming and cultivation of protective foods, unless we create and expand the market for higher agricultural products. But these markets are usually provided by concentrations of urban population in command of high purchasing power. The prosperity of Danish agriculture and the success of Danish Co-operatives have been greatly helped by the easy access they enjoy to the wealthy market of the United Kingdom ; and our agriculture will become efficient in the measure that our country is industrialized.³⁵ Industrialization will develop the technique and resources of our agriculture and enable it to release land and labour for the production of industrial goods. Each acre will produce more food so that more land will be available for the cultivation of industrial crops, and each farm worker will turn out a larger excess over his own needs, which will feed, clothe and house our non-farming population. A steady movement of the agents of production out of agriculture to other occupations is thus a necessary concomitant of economic progress ; it will mean not merely a transfer from one occupation to another, but a process of development from a lower to a higher level of labour productivity. Secondly, we have ample resources in men and materials, and though they are not as copious as is commonly supposed, they are far from being adequately exploited. We can, therefore, go a long way along the path of industrialization before we reach the limits set by natural factors. Thirdly, the case for industrialization would remain strong even if we never

35. Discussing the average yield of wheat per hectare in various European countries in the years 1931-35, the *Economist* concludes : 'The first and most important point is that the countries which are highly industrialized, and those whose peasants have an efficient co-operative system obtain the highest yields. The purely agricultural countries are at the bottom of the list'. (6 May, 1944, p. 592).

attain the standard of development that U.S.A. and Western Europe have reached. There is a wide selection of industries in which our comparative disadvantage (advantage) in production is less (more) than in agriculture, and they can be developed to the benefit of this country and of the world in general. An Indian cotton mill or iron and steel factory, equipped with modern machines and working on raw materials obtained at home, should suffer less by comparison with corresponding enterprises in the West than the tiny under-capitalized Indian farm producing cereals does by contrast with the grain farms of the New World or even of Western Europe. That we do not normally import cereals from abroad must be due, in great measure, to the fact that agriculture is a sweated industry in this country.

But to state the case for industrial development is not to prove either that we require a rapidly growing population to achieve it or that it can, by itself, completely solve our population problem. We do not want further increase of number to extend our industrial structure ; we can easily accomplish it with our present strength. On the side of supply, we have a labour force adequate to the creation of a diversified pattern of large-scale industries. ‘Whereas only a few years ago,’ says Butler, ‘it was said to be difficult to obtain labour in industry, that complaint is not heard to-day. On the contrary, during the recent boom in the cotton trade, Bombay, Cawnpore and Ahmedabad were able to recruit tens of thousands of additional workers needed to run a night shift with no difficulty whatsoever. At Jamshedpur, remote though it is from the large centres of population, the steel works turn away hundreds every day. The number of men wanting to go to sea is so great that the unions have been urging a system of engagement by rotation on the shipowners of Bombay and Calcutta. In fact, there is probably no industry in the country that could not recruit all the unskilled

labour it required within a few days or weeks'.³⁶ What, however, is lacking is an adequate supply of skilled workers and technically trained persons. But to remove this want, we require more capital to invest in human beings, to feed, educate and train them properly, and not a larger supply of men and women. Indeed, our redundant labour is already a drag on industrial efficiency and an impediment to adequate investment of capital ; for it helps to depress the wage rate of the factory worker and weakens the incentive of the employer to employ skilled workers and higher technique of production.

On the side of demand, too, we have a population big enough to enable us to realize fully the economies of division of labour and capitalistic production. That in practice, however, division of labour is extremely imperfect, and large scale enterprises are still few in our country is explained by the fact that mere numbers do not define the extent of the market. Potential consumers must have enough income to be effective purchasers, and an increase of number which is not accompanied by growth of purchasing power may restrict rather than widen the market for industrial goods. This is obvious in the case of luxury goods, the demand for which increases with the income of the purchaser ; ten men with bank balances buy more cars than a hundred persons who keep their savings in stockings. But it is true of even the common necessities of life in our country. Where, as in the U.K., income per head is high enough to cover expenditure on these and leave something over, increase of numbers is followed by expansion of consumption and investment which takes place independently of short-period variations of national income. But if income per head is already low, as in our country, increasing population may restrict

36. H. Butler, *Problems of Industry in the East*, p. 8.

individual consumption more than it adds to the number of purchasers or temporarily maintain consumption at the expense of permanent investment and long-run income. The existence of unsatisfied human want is not equivalent to effective demand. Otherwise, we should not have over-production of sugar, and a slowly expanding output of cloth, even though tens of millions in the country seldom taste sugar and millions go about insufficiently clothed.

VII

We do not require a larger and growing population to industrialize our economy. Can industrialization, however, solve the problems which our increasing population has created ? Obviously, to be able to answer this question we should get some idea of the scale on which industrialization must be achieved and that is furnished by the size of our surplus of farm workers at present and the net addition to our working population in the near future. In a recent study of Indian poverty,³⁷ Mr. Tarlok Singh puts the surplus of farm workers in British India at 15·5 millions, on the basis of an average work unit of 10 acres per farmer, a work unit being defined as the area which a farmer can cultivate with the aid of his family and a pair of plough cattle. This estimate does not postulate any important change either in the character or in the technique of our agriculture. Evidently, if we want to change these and shift the emphasis from cereal cultivation to live-stock husbandry, the size of the average farm has to be larger and the surplus of agricultural workers would be correspondingly greater. Drawing upon experience in Europe, Yates and Warriner conclude that 'for dairying, it is the farms of over fifty acres which prove the more

37. Tarlok Singh, *Poverty and Social Change*, Ch. V.

successful'.³⁸ Even if we set our standard at half the European level, we shall require farms of, say, 25 acres per farmer. But this will probably swell the surplus of farm workers by another 10 millions. Thirdly, any attempt to mechanize our farming in an appreciable measure will augment the rural surplus enormously. An American expert³⁹ gives the following estimate of hours necessary for growing and harvesting an acre of wheat land yielding 20 bushels.

Man hours

In 1830—	55·7 (Seeding and harvesting done by hand)
In 1896—	8·6 (Horse drawn drill and binder)
In 1930—	3·3 (Tractor drawn drill and harvester combine) ³⁹

We need not, however, think of mechanization only in terms of giant American or Russian machines. Smaller editions may be evolved to suit the needs of our densely populated areas, and the rate of labour saving need not be as great as a drop from 55·7 hours to 3·3 hours implies. But even then the effect of mechanization on farm labour will be disastrous; the existing surplus may be easily trebled.⁴⁰ And finally,

38. *Food and Farming in Post-war Europe*, p. 68. According to the authors '... the most successful dairying the world has seen is run on the 50-150 acre farms of Holland and Denmark'. p. 68. 'In Great Britain the size of the average dairy farm exceeds 100 acres and in New Zealand and the United States dairy farms average about 150 acres'. N. Wright, *op. cit.*, p. 11.

39. *Economist*, 6 May 1944, p. 592.

40. It is absurd to expect that this surplus labour will be wholly taken up by industries manufacturing and repairing machines, as some people think.

to the above estimates must be added another ten million workers on account of the growth of population in a decade. Thus on an extremely conservative estimate industrialization will have to provide jobs for, say, 30 million workers in ten years time.

Can we industrialize our country rapidly enough to accommodate this immense working population ? 'The field of employment' says Alfred Marshall, 'which any place offers for labour and capital depends, firstly on its natural resources ; secondly, on the power of turning them to good account, derived from its progress of knowledge and social and industrial organization ; and thirdly, on the access that it has to markets in which it can sell those things of which it has a superfluity'.⁴¹

We do not as yet possess comprehensive and completely reliable estimates of our natural resources, though these are generally known to be varied and, in some instances, large. Nor is it possible to give estimates of all the material ingredients of industrial development that we possess. We may, however, use data regarding the more important ones to indicate our prospects. 'The raw materials which are used in, by far, the greatest physical quantities in manufacturing industry, transport, etc. as a whole are coal,....petroleum....and iron ore....'⁴² Coal is essential to the production of steel, and coal and steel together are the sinews of industrial life. The following table⁴³ shows how we are placed in respect of these as compared with other countries.

41. *Principles of Economics*, 8th Edition, p. 668.

42. A. J. Brown, *Industrialization and Trade*, p. 17.

43. Brown, op. cit., p. 21, Table II. The data in this table, in particular those relating to India, should however, be taken with caution ; India's geological wealth is very imperfectly known.

Natural Resources per Head

Country	Coal and Lignite Reserves. Coal equivalent (tons/head)	Potential Water Power at Ordinary Minimum Flow (H.P./head)	Iron ore metal content (tons/head)
United Kingdom	.. 3,700	0·015	38·1
West Continental Europe	.. 1,510	0·20	31·4
East Continental Europe	.. 980	0·10	4·1
U.S.S.R.	.. 6,300	0·46	94·0
U.S.A. and Cuba	.. 17,000	0·25	48·0
Canada and			
Newfoundland	.. 37,300	2·27	217·1
South Africa	.. 20,600	0·23	300·0
Australia and			
New Zealand	.. 3,580	0·64	20·7
Argentine, Uruguay, Chile	.. 107	0·48	12·7
India	.. 66	0·10	5·9
China	.. 546	0·05	1·4
Japan	.. 227	0·10	0·4
All countries listed	.. 3,000	0·16	24·6

It is clear from the above table that we are not as richly endowed by nature as many of us think ; our economic potentiality is not of an order which is comparable with that of the U.S.S.R. or North America. However, we have ample supplies of certain raw materials to enable us to operate important large scale industries, and whatever our resources, we are not exploiting them as fully as we can, so that there is plenty of room for immediate industrial expansion. We need not, therefore, worry about the supply of raw materials ; we can rely mainly on our resources and draw upon foreign countries for those which we do not possess.⁴⁴

44. This way of framing the population issue is, however, not quite satisfactory. It reduces to a static form a problem which, is, in substance, dynamic and skips over the difficulties of transition from a

On the other hand, we have an inadequate supply of the second requisite of economic development, viz., the power to convert our resources into consumption goods and services and into instruments of production. We lack the skill, the knowledge, and the capital necessary to rapid industrial progress, and only if we can acquire these in sufficient quantity and quickly enough, we can put the ghost of Malthus back into the cupboard. It is, however, extremely difficult to estimate the amount of capital we shall require. In the first place, that will depend upon the kind of industrial structure we want to erect in our country. If we aim at autarky or a high degree of industrial self-sufficiency, we shall need a full complement of heavy, medium and light industries, and the amount of capital necessary to achieve our objective would be large. On the other hand, we may concentrate on those industries in respect of which we enjoy natural advantages, securing the residue of manufactures by way of international trade, and as these industries would be chiefly 'light' industries, our capital need would be smaller too. If our industrial policy were guided by economic considerations alone, we should have a structure of the second type rather than the first. The reasons for this choice are obvious. We have, in the first place, a small supply of capital and an abundance of labour. We, therefore, enjoy a natural advantage (comparative) in respect of light industries, which are more labour-intensive than heavy industries. We possess, similarly, an advantage in respect of industries like iron and steel which use heavy raw materials

state of under-development to that of adequate exploitation of resources. For, it is possible, that though the resources of a community are ample, they may fail to get developed at a rate that ensures rising income per head, and for this the rate of expansion of the population itself may be responsible. The people may remain poor, even though the country is potentially rich, for the simple reason that the rate of change of number comes in the way of the proper exploitation of its natural wealth.

of local origin. The high cost of transporting the products of these industries over long distances gives us natural protection against foreign competition. Thirdly, we have at present a limited quantity of enterprise engaged in the preliminary processing of our agricultural raw materials. But in future we need not send out oil-seeds and raw or imperfectly tanned hides and skins to receive them back as refined oil and tanned leather. We should be able to carry out the conversion within our own borders and take full advantage of the local supply of raw material and our large home market. However, economic considerations alone will not determine our industrial policy ; nor would it be correct for us to be guided by them alone in a world in which wars have not ceased to be a grim and insistent reality. We should have heavy and medium-heavy industries necessary to the defence of the country, even though their establishment can not be justified on economic grounds.

Secondly, our aggregate need for capital will depend upon whether we choose to plan our industrialization or leave it to the forces of *Laissez Faire* economy. The choice will influence the amount of capital we shall want. Planned development will call for larger capital than un-co-ordinated expansion under *Laissez Faire*. Under *Laissez Faire* the economies originating in the expansion of individual industries receive more attention than those which arise from the simultaneous growth of a variety of enterprises. This often results in arrested development of the former, simply because other industries necessary to support them on the side of demand or supply are non-existent or undeveloped. On the other hand, under planning the development of different industries is co-ordinated ; they act and react upon one another, providing raw materials and markets for one another and creating by their simultaneous growth a fund of experience and a climate

of opinion in which adaptation becomes easy.⁴⁵ We have to-day an iron and steel industry of decent size, but we would have had it much earlier if its development had been linked deliberately to the expansion of our railway system.⁴⁶ Both economic and non-economic considerations suggest that we should plan our industrial development rather than leave it to the forces of the free market. We have to make a long leeway and create new employment opportunities on an enormous scale, and these we can do only by means of planning. But planning will require more capital than *Laissez Faire*, though the planned method will secure a larger quantity of it both in the present and in future.

VIII

How much capital do we require to evolve an industrial structure that will suit our conditions and provide jobs for, say, 30 million workers? Writing on the industrialization of the countries of Eastern and South-Eastern Europe in which basic economic conditions resemble those in our country, P. N. Rosenstein Rodan concludes that the amount of capital required per worker can be put at between £300 to £350.⁴⁷ The

45. See 'Industrialization of Eastern and South Eastern Europe' by P. N. Rosenstein Rodan, *Economic Journal*, Sept. 1943, for a brilliant exposition of this thesis.

46. The basic defect of our tariff policy is not that it is 'discriminating', but that the principles of discrimination are applied to the conditions and prospects of individual industries considered in isolation. Starting from this angle, a policy of discrimination is bound to be negative, while what an undeveloped country with unexplored possibilities requires is a positive policy in which the inter-dependence of the different parts of the industrial structure is used as the basic consideration for the evolution of the tariff structure.

47. Industrialization of Eastern and South Eastern Europe, *Economic Journal*, June—September, 1943. The rupee equivalent of Rs. 4,000 to Rs. 4,667 does not represent too high a standard of capitalization. In our country the amount of paid-up capital and reserves of factories—using these as a rough measure of capitalization in default of a better one—

estimate is based upon a classification of industries into heavy, medium and light, includes provision for housing, communications and public utilities, and allows for a certain number of heavy industries in the scheme, though light and medium industries, in particular, the former, preponderate. If we adopt the standard suggested above, we shall require for a working population of 30 millions an aggregate capital supply of £9,000 millions or Rs. 12,000 crores. To this sum have to be added an appropriate amount to cover the cost of maintaining old and new capital and finally another quantity to provide for the development of agriculture. When these additions have been made the total capital requirement over, say, ten years would be of the order of Rs. 20,000 crores.⁴⁸

For the supply of this capital, we must turn to two sources : internal, the savings of the nation, and external, borrowings from abroad or liquidation of our foreign assets. The proportion of savings to aggregate income varies from country to country and from period to period. We shall, however, be near the mark if we assume a saving of 8% of our national income under *Laissez Faire* and 15% under planning. Even rich countries like the U.K. and the U.S.A. with probably a wider dispersion of income than this country saved in

per wage carner was about Rs. 1,800 in 1939. This is too low. On the other hand, in the U.S.A. the amount of capital used (according to rather rough approximations) per wage earner in the three major branches of industrial activity, viz., rail roads, mining and manufactures ranged from \$7,000 to \$10,500 (Rs. 22,000 to Rs. 33,000) in 1925. (Durand E. Dana, *American Industry and Commerce*, p. 199). The figures would be still higher for recent years.

48. This estimate includes a provision of 6% per annum on account of cost of maintaining capital and Rs. 1,500 crores for agriculture, but is exclusive of the amount of capital that has to be invested in 'skilling' a proportion of our workers. If we assume an average expenditure of Rs. 250 per worker and train 10% of our workers, we shall want a capital of Rs. 10,000 crores. Rosenstein Rodan puts the cost at £100 per worker for Eastern and South-Eastern Europe.

pre-war years a similar fraction of their total incomes. A planned economy can, of course, secure larger savings out of a given national income than *Laissez Faire*.⁴⁹ In 1931 we had a national income of roughly Rs. 2,000 crores. Assuming that it had since then expanded and allowing for changes in the value of money it was probably of the order of Rs. 2,400 crores prior to the war. Internal savings at 15% would have provided in ten years only Rs. 4,500 crores, even if national income rose by 50% during the period. This is a small proportion of our total capital need which we have put at Rs. 20,000 crores, and even if we obtained

49. According to Colin Clark the percentages of savings to national income in the U.K. and the U.S.A. were as follows :

	U.K.	U.S.A.
1925-30 ..	7·6	10·9
1934-37 ..	7·0	5·0

Referring to the possible size of internal savings relatively to national income in the area studied Rosenstein Rodan (*loc. cit.*, p. 273) says : 'Even if we take account of the gradually rising national income, rates of savings beginning with 8% and leading at the end of a ten year period to 15% would seem to represent a maximum one can plan for'. In some notes on a long-run plan of economic development of Poland, Dr. Leon Baranski assumes internal savings at 7·5%, 10·5 and 14·8% of the rising national income in the first, tenth and nineteenth year (quoted by E. Staley, *World Economic Development* p. 76). The proportion of savings to national income in the U.S.S.R. has been variously put by different authors. Rosenstein Rodan takes it at 18%, while Sidney and Beatrice Webb state : 'In the U.S.S.R. this share (i.e., savings or internal investments, has during the past few years been as much as 30 or 40 per cent of the total national income, being many times as large a proportion as in any other country at any time whatsoever' (*Soviet Communism*, pp. 521-22). On the other hand, Colin Clark (*The Conditions of Economic Progress*, p. 406) has the following figures of savings as % of national income in Russia :

1925-30	7·8%
1934-33	14·2%

50% of our requirement from abroad,⁵⁰ our capacity to save would amount to less than 50% of what we must have from internal sources.

It is obvious that the provision of an adequate quantity of capital for industrialization will impose an unbearable strain upon a community of persons, most of whom can hardly make both ends meet. Suggestions have, however, been made that we should circumvent this difficulty by leaving some portions of our economy in the primitive stage. We need not, it is said, re-organize our agriculture on capitalistic lines, and for the supply of industrial goods we can rely upon cottage and small-scale enterprise. Now this would be a completely satisfactory solution, if our objective were merely to secure employment for as large a number of workers as possible without reference to the amount of income they may earn, and it is a necessary expedient during the time which a wholesale re-organization of our economy will take. But in the long run and from the stand-point of raising our national income, it has little force. In the first place, we cannot increase the living standards of our farmers and artisans, unless we replace small-scale primitive farming by co-operatively worked or mechanized cultivation and establish large-scale factory industry to take the place of handicrafts. Secondly, a poverty-stricken rural population and an inefficient agriculture will seriously handicap industrial expansion. The large mass of the people would be too poor to buy the products of factory industries, while the production of food and other simple necessities of life would take up too much of our land and restrict the supply of industrial raw materials, or alternatively an attempt to

50. Rosenstein Rodan takes for granted that the countries of Eastern and South-Eastern Europe will provide at least 50% of the total capital needed for their planned economic development. In the case of Japan, according to a very rough calculation, imports of capital goods amounted to some 40% of total investment during the first decade after 1900.

meet the requirements of industrial development in men and material with agriculture still following its primitive technique might create an insufficiency of food supply. We cannot, therefore, bypass the problem of capital supply by refusing to re-organize some sections of our economy.

The second source of capital supply is external : foreign borrowing and liquidation of our foreign assets. Foreign capital has been an important aid to the economic growth of undeveloped countries, whose current income is insufficient to provide an adequate surplus over current consumption, even though they are potentially rich. In this country we have large natural resources and a big surplus of employable labour that can be engaged to turn out not only consumer's goods but also instruments of production in the long run. But for quite some time we must obtain man-made physical equipment from abroad to assist our labour to convert our raw materials into useful goods and services. We shall also want to import foreign skill and experience or pay foreign countries to 'skill' our workers, while to utilize the fixed equipment and skill imported from abroad and employ our domestic labour, we should require internal monetary savings.

Evidently the amount of foreign capital required by us will depend, given our total need, on the proportion of the latter that we can meet out of our own resources. We have put the proportion of internal savings at a maximum of 15% of our national income or Rs. 4,500 crores during a ten year period. With our total need for capital estimated at Rs. 20,000 crores there will remain a balance of Rs. 15,500 crores that must be met from external sources. Two distinct questions now arise : first, are we likely to secure this huge amount from abroad and on terms that satisfy us, and, secondly, can we conveniently absorb the amount into our economy ? Certain general considerations suggest that capital for international investment will be abundant and cheap in post-war years. The war has enormously extended the

productive capacity of the U.K. and the U.S.A., the two chief international lenders of the future, while so long as these countries retain their present social and economic arrangements and their populations continue to grow slowly, they must expand their exports and create export surpluses in order to secure full employment to their workers. Foreign lending will be an important aid in this direction. It is, therefore, likely that the price of foreign capital will be low and with the immense development of international communications, we may find it easy to import foreign technical skill and supervising talent. On the other hand, the U.K. and the U.S.A. may decide to use their surplus income to reduce inequality of incomes at home and improve and develop the instruments of common living for their own peoples. To the extent that these things are done the urge to invest abroad will be less and the amount of British and American funds seeking foreign outlets will be cut down. However, it would appear on balance that international capital will be more copious and less dear than before, and though there will be a period of higgling and haggling and competitive manœuvring by lenders to employ their loan power for political ends, we should get our supply of foreign capital cheaply, if we can wait beyond the period of immediate adjustment.

But probably the rate of interest that lenders will charge us will be the least important of the factors that will govern the quantity of foreign investment in this country. Other factors, viz., the conditions on which we borrow, and the effect of capital import on our balance of payments, will be much more significant. The development of this country on modern lines was initiated in the 19th century with the help of foreign capital. Our own resources were small, and trade and commerce absorbed a good part of the actively employed indigenous capital, while the State did little to develop the domestic capital market. But the imported capital came on special terms and enjoyed privileges of all kinds, written and unwritten. It was, moreover, distri-

buted along strictly limited channels. The largest portion of it went into State loans or loans which carried State guarantees and was used to develop public utilities, in particular, the railways. A much smaller fraction was invested in industrial equities. But here too there has been concentration in a limited field ; a small number of industries, viz., jute, tea, coal, foreign trade and exchange banking have absorbed the major part of foreign industrial capital. And in all these industries foreign enterprise has built up for itself a position of monopoly, so that quite often the direct return on the capital invested—the dividends paid—is much less important than the various monopoly gains that accrue to foreign entrepreneurs.⁵¹

Anxious though we are to import foreign capital in future, we are reluctant to receive it in the form and on terms which obtained in the past. There is enormous scope for the development of public utilities in this country, but we should not like to use foreign capital to bring it about. The import of loan capital involves fixed payments from year to year and introduces a rigidity into the debit side of the balance of payments. In the past this rigid element severely curtailed our freedom in the sphere of currency and exchange management and invested the question of export surplus with an importance that overshadowed other relevant considerations. Thanks to the war and the enforced saving of the people we have almost liquidated our fixed foreign obligations and even accumulated a respectable sterling balance.⁵² We should not like to exchange this hard earned freedom for fresh supplies of loan capital from abroad. We must secure as much as we can of foreign assistance in the shape of equity capital, providing the

51. In this respect, however, there is little to choose between foreign and Indian enterprise.

52. India had a pre-war sterling debt of more than Rs. 400 crores which has been reduced to Rs. 14 crores only. On the otherhand, she has accumulated sterling credits to the tune of Rs. 1,363 crores.

necessary loan capital for public utilities out of our own savings.⁵³

But the foreign lender is not willing to supply equity capital except on his own terms ; he insists on sharing in the management of enterprises to be set up in this country with his help. In theory there is little to be said against the idea of Indian and foreign enterprise and capital co-operating for the economic advance of this country. In practice, however, foreign enterprise has supported and received support from foreign political power and the aggregate price that the borrowing country, in particular a subject country, pays for foreign assistance is greater than the dividends distributed on the stocks and shares held by foreigners. To keep this price as low as possible, Indian industrialists insist on a minority rôle for the foreign capitalist. But foreign interests are not prepared to accept the new status that we are offering them ;⁵⁴ the mere difference in return between investments at home and in this country does not seem to be sufficiently attractive.⁵⁵ However, we may still get foreign capital and on our terms, not immediately, but after a period during which lenders have an opportunity to readjust their economy and realize their dependence on export of capital as a means to full employment at home.

But even if we get foreign capital readily, we cannot absorb any and every amount of it. We should here

53. The National Planning Committee of the Indian Congress, however, states : 'It is important that the investment of foreign capital in Indian enterprise should not ordinarily be permitted hereafter in a form which would entitle it to ownership and management in respect of industries of national importance.' *Commerce*, Bombay, 17 November 1945, p. 673.

54. 'Doubtless foreign capital would be welcome on Indian terms or capital goods would be readily bought through long-term credit arrangements, but neither of these alternatives might be expected to find favour with the United States groups.' Dorothy V. Knibb, *Foreign Commerce Weekly*, 21 July, 1945, p. 23.

55. There are still large undeveloped countries, e.g. China which are prepared to receive foreign capital on almost any terms.

distinguish two different issues : first, that of earning enough on the foreign capital imported and invested in our country, and second, that of securing means to make payments to the lending country or countries. We need not consider the first problem; nothing more can be said about the productive use of foreign capital which does not apply to all investments, foreign and domestic. But two important points should be noted about the second problem. First, capital investment—foreign and domestic—leads to an expansion of consumption and of imports almost currently. To prevent our foreign exchange resources from being dissipated in the purchase of extra consumers' goods, we shall have to impose restrictions upon the inflow of these from abroad. Secondly, the investment based upon the import of foreign capital must be properly distributed so that it increases our capacity to export and enables us to meet the service of the debt in the short and the long period. In the past foreign capital went mainly into railways, the development of which greatly facilitated export of raw materials. But it is difficult to think of important public utilities which will have similar consequences in future, and it is certainly undesirable that we should in future rely upon the export of raw materials rather than that of industrial goods to meet our foreign obligations. We can, of course, temporarily expand our export surplus by bringing more industries under protection and cutting down imports of foreign manufactures. But the scope for such an operation must be limited; our major industries are already receiving protection, and we cannot hope to restrict our purchases from abroad without provoking foreign countries to buy less from us. On the other hand, it will be some time before our newly established infant industries acquire sufficient strength to compete in the world market and provide us with an export balance adequate to the service of our foreign debt. These considerations suggest that the amount of capital we can import from year to year will be governed by the rate at which our economy progresses and our

ability to compete in the world market develops. Obviously, with the inflow of foreign capital limited by these factors there is no guarantee that it will be large enough to cover the needs of our rapidly growing number.

IX

It would be dogmatic to suggest that we cannot, in any circumstances, carry out the programme of economic re-organization which has been outlined in the preceding pages. We may, on very special assumptions regarding the structure of our economic and political society, achieve the feat. But the odds against us are extremely heavy and the cost of success in terms of human happiness will be immense. We shall, in the process of attaining it, further depress the living standard of our people, and in the attempt to improve our material capital we may cause serious damage to its human counterpart. This is a risk which we can hardly permit a rapid increase of number to aggravate; for already the quality of human capital is pretty low in this country. In the race of life we are greatly handicapped by wide-spread poverty, extensive illiteracy, high mortality and pervasive ill health and infirmity. No people have, therefore, greater reason to be anxious about the quality of its life than we, and granting that we can enlarge our economic resources, we must decide whether we should not use this power to raise our living standard rather than make mere existence possible for increasing numbers. Of course, limitation of number alone will not secure us the objective, but if we can reduce the pressure of population, we shall have considerably simplified the task of attaining it.

We can hesitate to make up our mind on this issue on three grounds. In the first place, some of us feel that there is no real conflict of the type that has been posed; we can, in future, both multiply unrestrictedly and enjoy an increasing standard of life. All we have to do

is to obtain political freedom and direct our energy wholeheartedly to the development of our resources. This study has not been concerned with the political aspect of the population question. But that does not imply that politics is unimportant to the economics of population. Quite the contrary; politics is concerned with the nature, source and distribution of sovereign power in a community, and these are important to the manner and rate of development of the country's resources. There are serious political impediments to the proper use of the wealth of this country, and we need political freedom urgently to relieve us of that sense of frustration which destroys creative power. But political freedom, though it will open out new opportunities and release new energy will not change the objective facts of our material existence; we shall have still to solve the problem of maladjustment between numbers and resources at, more or less, the levels at which we can now envisage them to be.

Secondly, there is, in this country, an ancient and widely held belief that the quality of the life of a person should be independent of the amount of his material possessions, so that even if we become poorer as a result of growing number, we need not be unhappy or lose our dignity as human beings. The core of ethical truth in this belief cannot be denied; wealth can be and is often pursued at the expense of moral welfare, and we may be easily spoilt by a superfluity of material possessions. But all this has little relation to the life of the common man in India; he does not enjoy even that modicum of income which is necessary to independence and good life, and unless our gods are extremely narrow-minded, he should not forfeit his place in heaven, if he had more of the goods of this life.

We have, thirdly, a set of people who are not opposed to restriction of number as such, but who violently disapprove of the methods by which alone, it seems, it can be accomplished. They would like the end to be achieved

by moral restraint and not by the mechanical and chemical means which are in vogue to-day. The issue between birth control and moral restraint has been debated widely. It is only necessary to state it briefly here. Moral restraint implies postponement of marriage and continence within married life. But for postponement of marriage to exercise a significant influence on our rate of growth, the average age at marriage of our women should rise from its present level of 15 or 16 years to over 21 years. This would mean that many women will never marry or marry pretty late in life. Such a change does not, however, seem likely in the near future, partly for socio-economic and partly for biological reasons. In the circumstances of our social and economic life, there is for the vast majority of our women no avocation which they cannot pursue as well after marriage as before it. Moreover, for the common man in India to whom few sources of enjoyment are open, marriage makes a large ingredient in the cup of happiness. His wife is a help and a solace, and the Indian girl fills her rôle as well at sixteen as at twenty-two. The biological obstacle is connected with the short span of our life. Married life involves responsibilities, which are often undertaken too early, but which may be entered into too late. With the mean after life time at 25 being only $26\frac{1}{2}$ years, few persons can reasonably run the risk of postponing matrimony and rearing up children to late ages. Our cycle of life is shorter, and its different phases must begin earlier than where people live longer. We should not, therefore, expect postponement of marriage except by the few years necessary to maturity of the parties concerned, but this change will not depress our rate of growth.

Continence within marriage is advocated mainly on moral grounds. Every act of self-restraint, it is said, strengthens our moral fibre and elevates our nature. Nobody will contradict this general proposition. It may, however, be pointed out that life offers innumerable op-

portunities of self-control of a reasonable nature, without our having recourse to the almost total abstinence which continence, as an instrument of population control, implies. On the one hand, the sex instinct in the normal man is immensely strong and deep-rooted. On the other, even a single act of sexual congress in a year may fertilize the ovum and keep up an yearly flow of births. In the face of these facts, continence would seem to be an extremely imperfect means of restricting population growth. We need something more effective and also calling for less heroic sacrifice on the part of the normal man than almost complete abstinence, and that is supplied by modern methods of birth control.

But many people in this country are still violently opposed to these methods, partly on medical but mainly on moral grounds. They consider artificial interference with the natural process of sexual union as extremely harmful to health. In answer to unproven views of this type, it will suffice to quote the following conclusion of Dr. C. V. Drysdale :

'Nothing can do away with the fact that as birth rates have declined (in the West) the longevity of both men and women has enormously increased—from the figure of 35 to 45 years before birth control commenced to 60 to 65 years to-day, and that it is still rapidly increasing. Moreover, recent figures have shown that the improvement in the death rates has taken place to a most remarkable extent, especially during the reproductive period, both in men and women.'⁵⁶

The moral arguments which are usually advanced against birth control are two. First, it is considered unnatural and immoral ; those who use contraceptives are supposed to interfere with Nature and cheat her of her end; they gratify their passions, and yet avoid conception which is its natural consequence. On this view of things, however, every act of human intelligence should be considered unnatural and immoral. We are

56. Judgement on Birth Control, *Eugenics Review*, January, 1933.

constantly controlling, directing and thwarting Nature to serve our purposes rather than her own. And users of contraceptives cheat Nature far less than she cheats herself; for, out of every 5 million sperms ejected at each orgasm, only one finds its way to the ovum to fertilize it, the rest dies after a fruitless existence. Secondly, contraceptives are supposed to promote excessive sex indulgence in and out of marriage. Some abuse there is of the freedom from the consequences of sexual union which contraceptives secure; but the evil does not seem to be as serious as it is made out. Hosts of normal persons in the U. K., for example, have not only had easy access to the means of birth control for a long time, but they have consistently applied them. But to assume that they have indulged excessively and to their undoing is in accordance neither with everyday experience nor with the Registrar General's statistics.⁵⁷

On the other hand, the only other check, viz., the fear of undesigned parenthood, does not seem to be sufficiently powerful; witness the uncontrolled flow of births from many marriages and the extensive resort to abortion in and out of wedlock. This ancient deterrent having failed, we have to evolve a positive code of morals in relation to sex in order to limit the abuses to which contraceptives may be put. We should start with the recognition of the sexual urge as a powerful, ever-present, but completely amoral instinct, which should be employed to serve both biological and cultural ends. To achieve this double purpose the individual must exercise continuous self-restraint and submit to considerable supervision by society. Sex association is not just an opportunity for physiological licence, and only through discipline and moderation can one reach the higher enjoyment which is implicit in it. Besides, an individual can never hope to enjoy in respect of his sex life the same freedom which he is permitted with regard to some other instincts, say, hunger or

57. F. W. White *Birth Control and Its Opponents*, p. 142.

thirst; for sex association involves two lives and may lead to a third one, and the consequences of its abuse spread far beyond the individuals who participate in it.

To the building up of this new morality, modern methods of birth control should be an important aid. They relieve the married couple of the haunting fear of unwanted children⁵⁸ and give them opportunity to

58. The case for birth control has been argued here mainly in terms of limitation of the total number of children born to a married couple. There is, however, an equally good case for the use of contraceptives to regulate the spacing of births. Children often come too early after marriage, rendering the complex business of mutual adjustment of the newly wedded difficult. They also follow one another in quick succession, damaging the health and happiness of the mother and encroaching upon the care and attention which each child should properly receive from its parents. Data on these aspects of the Indian population question are extremely limited. The following information regarding the population of Baroda State in 1931 is, however, interesting :

Table I

Size of family by number of children born
(Only completed fertility families are considered)

No. of Children born	0	1	2	3	4	5	6	7	8	9	10 and over
% age of total families	2·2	4·4	6·4	9·3	11·2	13·8	13·9	13·0	10·2	7·0	8·6

Source—*Census of India, 1931, Vol. XIX, p. 171.*

Two-thirds of these families had 5 children or more each, and one-third seven children or more each. There is here evidently a large field for the use of contraceptives.

Table II

Interval in years between births of successive children

Births	1st and 2nd			2nd and 3rd			3rd and 4th			
	Interval in years.	1-2	3	4 and over	1-2	3	4 and over	1-2	3	4 and over
No. of cases	1762	1732	4634	1847	1542	3262	1661	1297	2,072	

Source—Loc. cit. p. 189.

cultivate beauty and delicacy in sex life. And with this freedom will come a new feeling of responsibility both in respect of sex association and of the children who may be born of it. Used within the context of a positive sex morality, contraceptives should elevate and not degrade human nature.

The greater part of the small attention which the question of contraceptives has received in this country has been directed to its moral aspect; there has been little study of the practical difficulties which their use involves. These difficulties proceed from several sources. In the first place, we have to deal with a vast population of ignorant and illiterate men and women, and it will be some time before they can be made to realize the significance of the new help that science has brought. But this is not probably as great an impediment as it may appear at first sight. Our people have a saner attitude towards sex than people in the West, and once we can teach them the knowledge of contraception and the means of utilizing it, they will take to it without great hesitation. A far greater difficulty is presented by the circumstances of their physical existence. The supply of houses in this country is extremely inadequate⁵⁹ and only a small fraction of the population enjoy the spaciousness and privacy in living which are essential to the unobtrusive use of contraceptives. Secondly, we do not possess any organization, social or administrative, which can be used to propagate ideas and instruments of control. The medical organization of this country is extremely inadequate and nearly completely dissociated from the birth-control movement. Thirdly, the contraceptives in vogue are still too costly

In more than one-third of the cases investigated, the interval between the births of consecutive children was between 1-2 years and in about half the instances it was 3 years or less. Here surely is again another field in which contraceptives should be of great practical value.

59. The congestion is supposed to be greater in rural areas than in urban—*Census of India, 1931, Vol. I, Part I.* pp. 58-59.

and preparation for their use too elaborate to permit of their wide employment by poor and ignorant peasants and workers.

None of these difficulties, however, seem to be insurmountable. Once we accept the positive morality which the use of contraceptives implies, we should be able to devise ways and means of spreading the new knowledge and the instruments that make it effective. A much more serious impediment has been created by the political arrangement of our country. Under communal representation, individuals share in political power not as citizens of the country but as members of separate communities, and the more numerous a community is, the greater its share in the immediate and ultimate government of the people. Thus communal representation puts a premium on number as such and encourages competitive breeding by the different communities that make up the nation. Obviously, it is extremely difficult for the birth-control movement to flourish in this atmosphere of philo-progenitive rivalry. Those who are responsible for communal divisions in our political life have also placed enormous boulders on the path of economic advancement.

